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VOLUME 14 • JULY 1956 • NUMBER 3 JOURNAL OF ORAL SURGERY

Differential diagnosis of fibrous dysplasia and fibro-osseous neoplastic lesions of the jaws and their treatment

■ *Kurt H. Thoma, D.M.D., Brookline, Mass.*

Differentiation of fibrous (fibro-osseous) dysplasia, a disorder caused by an embryonic fault, from fibro-osseous lesions of neoplastic origin (ossifying fibroma) is of great clinical importance. In fibrous dysplasia, surgical interference should be limited to restoration of the normal facial contour. In ossifying fibroma, however, complete eradication of the lesion is recommended. This is especially true if the lesion is small, since eradication will prevent the development of a large growth, which, if removed, would result in a disfiguring operative defect.

It is agreed by pathologists that it is difficult to distinguish between the two conditions by histologic methods. In dysplasia, the stages of cell differentiation and cellular by-products—collagen, osteoid and bone—are the result of faulty development and abnormal functioning of the cells. In neoplasia, the same histologic picture may result because the tumor cells fail to differentiate completely and then proliferate in the attained stage of maturity. In dysplasia, a certain region of the facial skeleton is affected, involving one bone or certain segments of the face, such as the components of the middle face on one side or both, the mandible and maxilla on one side, and other combinations. In neoplastic formation, one focus, and more rarely several foci, develops into sizable localized tumor masses. These tumors continue to grow without regard to skeleton maturity, and may reach considerable size. Though the tumor cells tend to reproduce themselves in the stage originally attained, there seems to be a tendency toward formation of more mature tissue in time. In the early stage the fibrous tissue proliferates rapidly. Later the growth slows down, terminating after years in well-calcified, inactive tumor masses, containing a great deal of bone and sometimes also cementum in spheroid or trabecular form. These neoplastic lesions are generally

Honorary surgeon, Massachusetts General Hospital; professor of oral surgery, emeritus, Harvard University School of Dental Medicine; oral surgeon, Brooks Hospital.

classified as ossifying fibromas or fibro-osteomas.

The clinical findings interpreted by means of roentgenograms furnish the best basis for a differential diagnosis.

■ *Fibrous Dysplasia*

In fibrous dysplasia, the normal anatomic appearance, generally of the entire bone, is altered. It produces a distortion of its shape, a slowly developing expansion in various directions, rather than a localized swelling. It occurs in patients who are in good general health and have negative results of laboratory examinations. It probably is congenital in nature, though it is rarely noticed until the child is a few years old. It is believed by Berger and Jaffe[1] to be due to a developmental defect caused by faulty embryogenesis. Schlumberger[2] believes that it represents a nonspecific abnormal reaction to injury. In many instances, the patients are not seen until they become more conscious of their appearance, since there are generally no functional disturbances. It may be several years after the abnormality or deformity has been noticed that the patient appears for examination. Often the consultation is motivated by the occurrence of more rapid growth.

Examination reveals no change in the mucosa nor in the quality of the bone when it is palpated. In some instances the surface of the affected bone is smooth; in others, nodular. The inferior border of the mandible may become convex. The process is diffuse, and there is no distinct, precise indication of the extent of the involvement.

In the maxilla, the outer surface of the alveolar process may be expanded considerably, and the vault of the palate may become obliterated by the expansion of the bone. In the mandible, the lingual fossa may disappear, and the outer cortex may bulge laterally. All this may take place without affecting the position or the functioning of the teeth. If the neck of the condyloid process is involved, the affected side may elongate, causing asymmetry, facial disfigurement and a cross bite. The nerves supplying the mandible are not affected, since no anesthesia results, and the patient generally suffers no pain.

Though a great deal of deformity may develop over a period of years, its rate of progression is slow and tends to become arrested with skeletal maturation. Those affected adapt themselves well functionally. This adaptation applies not only to the occlusion of the teeth, but also to the temporomandibular joint, the motion of which is not affected. Curiously, the nasal cavity is not encroached on, even though the maxillary sinuses may be totally obliterated.

Although in most patients the disease is limited to the facial skeleton, there are instances in which the skull is affected. An interesting case in my series occurred in a girl in which the disease affected the maxilla alone when the patient was first seen at the age of 16. Later when she was 26, melanotic pigmented areas of the lips and mouth developed, and the disease was finally diagnosed as polyostotic fibrous dysplasia (Albright's disease) and in-

1. Berger, A., and Jaffe, H. L. Fibrous (fibro-osseous) dysplasia of jaw bones. J. Oral Surg. 11:3 Jan. 1953.

2. Schlumberger, H. G. Fibrous dysplasia of single bones (monostotic fibrous dysplasia). Mil. Surgeon 99:504 Nov. 1946.

volved numerous bones in the rest of the skeleton.

ROENTGENOGRAPHIC EXAMINATION—The roentgenogram shows a diffuse involvement of the affected bone. In the maxilla, the changes generally produce an increased density, since the radiolucent maxillary sinus becomes obliterated. It is of interest that in some instances the sinus is only partly involved, although this may be an early stage of development. In some instances only the alveolus may be affected; in others, only the tuberosity. In most instances the disease extends to the adjacent bones, such as the malar bone, since here no anatomic limits seem to be respected.

In the mandible, complete, diffuse involvement is quite common. In other instances, there are multiple areas of replacement of the normal bone. The roentgenographic appearance depends on the relationship of fibrous to calcified tissue, and intercellular deposit of ossified collagenous connective tissue, as partly calcified osteoid. In many instances, radiolucent areas predominate. These are irregular and often contain islands of well-calcified bone. In other instances, a radiopaque picture results, with alterations that present a characteristic granular picture. This has been spoken of as "ground glass" or "orange peel" appearance.

TREATMENT—Fibrous dysplasia may be amenable to complete excision if it affects only a very small area of the bone. Generally, when these cases are seen, the bone is too extensively involved to allow local excision. Resection of the jaw, however, is certainly not indicated. The surgical treatment, therefore, should be restricted to obtaining a good cosmetic result, removing perhaps more bone than necessary to allow for repair and re-formation of tissue. I have not found the use of roentgen ray therapy to depress the osteoplastic activity (as recommended by Phemister and Grimson[3]) to be particularly successful. Repetition of surgery, especially at the age when skeletal growth ends, is generally needed.

REPORT OF CASES—The following cases are reported for illustration.

Case 1 (Fibrous Dysplasia of Maxilla)—A 16 year old girl showed the typical unilateral middle face dysplasia (Fig. 1, above left), with obliteration of the maxillary sinus and involvement of the malar bone (Fig. 1, above right). The biopsy revealed osteoid deposited by fibroblasts filling the marrow spaces, and apposition of new bone with old bone being resorbed (Fig. 1, below).

Case 2 (Fibrous Dysplasia of Middle Face and Left Side of Mandible)—A 50 year old woman had considerable facial asymmetry and expansion of the edentulous maxilla. Roentgenographic study revealed a radiopaque dysplasia of both maxilla and mandible (Fig. 2, left and center). Histologic study showed well-calcified, mature-appearing bone trabeculae, with cellular fibrous tissue in the marrow spaces (Fig. 2, right).

Case 3 (Fibrous Dysplasia of Alveolar Process of Maxilla)—A woman 39 years old had noticed a swelling of the right

3. Phemister, D. B., and Grimson, K. S. Fibrous osteoma of jaws. Internat. J. Orthodont. & Oral Surg. 23:912 Sept. 1937.

maxilla 11 years previously. She had been unable to wear her upper denture because of acceleration of the growth during the last year. The roentgenogram revealed osteolytic enlargement containing calcified masses and producing pressure resorption of the anterior part of the ramus (Fig. 3, left). The histologic section is shown in Figure 3, right.

Case 4 (Fibrous Dysplasia of Maxillary Tuberosity)—A 45 year old woman appeared for examination with considerable enlargement of the right maxillary tuberosity. Subsequent roentgenographic study revealed a large radiopaque mass involving the tuberosity (Fig. 4). Pathologic study showed mature bone trabeculae with a fibrous marrow.

Case 5 (Fibrous Dysplasia of Mandible)—The patient, a girl 17 years old, was seen by Daniel Holland because of facial asymmetry. There was noticeable expansion of the bone with typical ground glass appearance of the roentgenogram (Fig. 5).

Case 6 (Fibrous Dysplasia of Primarily Osteolytic Nature)—This case is an illustration of the osteolytic type of fibrous dysplasia. It occurred in a woman 38 years

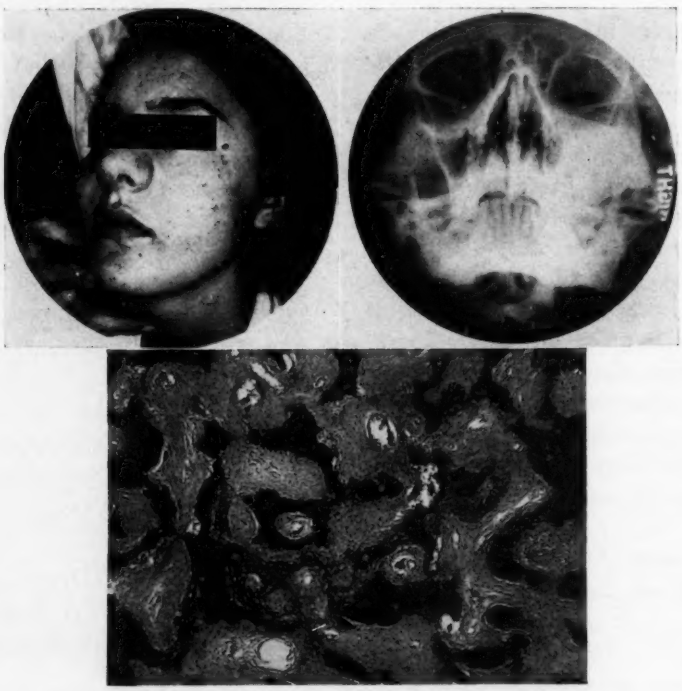


Fig. 1 (Case 1)—Above left: Fibrous dysplasia in 16 year old patient. Above right: Maxilla of patient. Below: Histologic section of growth

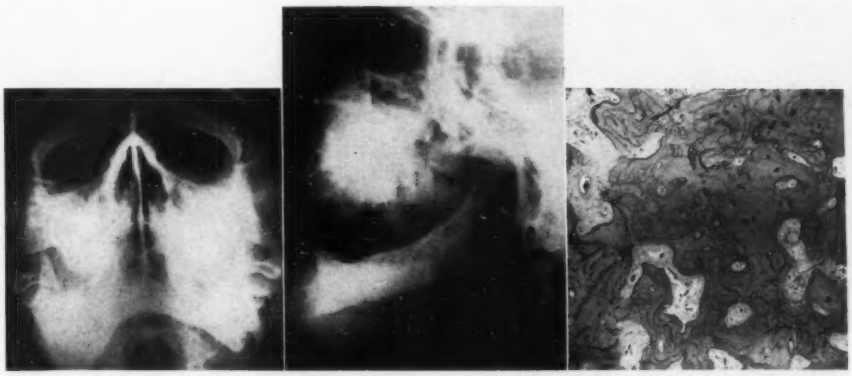


Fig. 2 (Case 2)—Left and center: Fibrous dysplasia of middle face and left side of mandible. Right: Tumor section from mandible of patient

old. There were multiple lesions of the mandible with evidence of osteoclastic activity in the area inferior to the molar teeth (Fig. 6, left). Today, ten years later, these areas have become practically obliterated, with deposit of bone (Fig. 6, right). This case is reported through the courtesy of Lester R. Cahn.

Case 7 (Bilateral Fibrous Dysplasia of Mandible with Islands of Mature Bone)—A 50 year old woman manifested bilateral enlargement of the mandible. The roentgenogram showed islands of well-calcified bone within osteolytic defects (Fig. 7, left). Pathologic study revealed the bony masses to be made up of extremely thick trabeculae with small amounts of fibrous tissue interposed between them (Fig. 7, right).

Case 8 (Fibrous Dysplasia of Mandible Involving Neck of Condyloid Process)—A 28 year old girl revealed facial asymmetry and a cross bite. Roentgenographic examination showed multiple osteolytic changes within the mandible, with extensive enlargements of the neck of the condyloid process (Fig. 8).

■ *Ossifying Fibroma or Fibro-Osteoma*

Ossifying fibroma may be used as a convenient term for the neoplastic fibro-osseous lesions, also known as fibro-osteoma. It is essentially a cellular fibroma, in which, according to the stage of differentiation attained, various amounts of a variety of calcified intercellular substance are produced. A number of writers have recently accepted the idea that some fibro-osseous lesions are of neoplastic nature. Sherman and Sternbergh[4] have expressed the belief that unilocular lesions are ossifying fibromas, Pindborg[5] stated that sharply circumscribed lesions may be considered neoplasms, and so did Waldron[6]

4. Sherman, R. S., and Sternbergh, W. C. A. Roentgen appearance of ossifying fibroma of bone. Radiology 50:595 May 1948.

5. Pindborg, J. J. Fibrous dysplasia or fibro-osteoma: report of case. Acta. Radiol. 36:196 Sept. 1951.

6. Waldron, C. A. Ossifying fibroma of the mandible. Report of two cases. Oral Surg., Oral Med. & Oral Path. 6:467 April 1953.

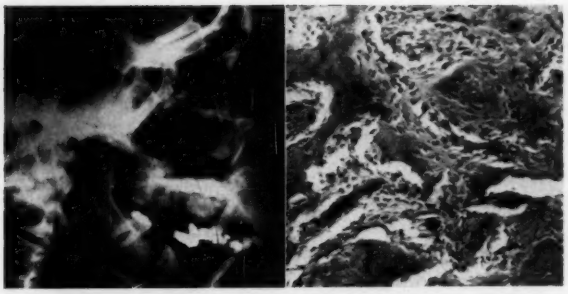


Fig. 3 (Case 3)—Left: Fibrous dysplasia of alveolar process of maxilla. Right: Histologic section of growth

and Lichtenstein.[7] It has also been said that the fibro-osteoma is the benign form of osteogenic sarcoma. Since Billing and Ringertz,[8] Traumer, as quoted by Billing and Ringertz,[8] and Coley and Stewart[9] have reported cases of osteosarcomas which developed in fibrous dysplastic lesions, there is additional proof of its neoplastic nature.

The ossifying fibroma is generally a well-circumscribed lesion that occasionally occurs in multiple form, developing from cell rests in a normal bone. The occurrence of multiple lesions is no argument against their neoplastic nature, since other lesions form similarly from various foci, as, for example, cementoblastomas and osteomas, which are closely related tumors.

The ossifying fibroma occurs generally in the second or third decade. The earliest stage is seen rarely, because of its insidious onset. Only when the growth starts to expand the bone, producing disfigurement or malocclusion, is the condition noted by the patient.

7. Lichtenstein, L. Bone tumors. St. Louis, C. V. Mosby Co., 1952.

8. Billing, L., and Ringertz, N. Fibro-osteoma; pathologico-anatomical and roentgenological study. Acta. Radiol. 27:129, 1946.

9. Coley, B. L., and Stewart, F. W. Bone sarcoma in polyostotic fibrous dysplasia. Ann. Surg. 121:872 June 1945.

Fig. 4 (Case 4)—Fibrous dysplasia of maxillary tuberosity in 45 year old woman

Fig. 5 (Case 5)—Fibrous dysplasia of mandible in 17 year old girl

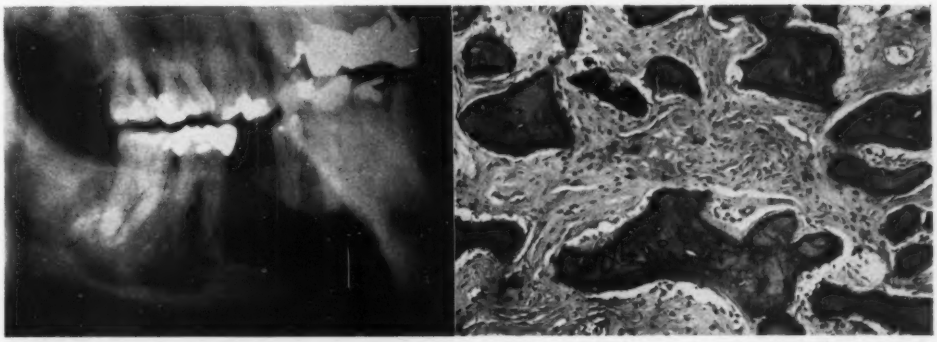


Fig. 6 (Case 6)—Left: Fibrous dysplasia of osteolytic nature in 38 year old patient. Right: Section ten years later. Note deposit of bone. (Illustrations courtesy of Lester R. Cahn)

ROENTGENOGRAPHIC EXAMINATION—The roentgenogram shows the location of the lesion and its involvement of adjacent teeth. It will disclose whether the lesion is solitary or multiple, whether the cortex is affected or the bone expanded. In some instances the lesion itself is surrounded by an encasement of cortical bone which forms at the periphery if encapsulated. In other instances there is no such well-marked limitation of the tumor.

The appearance of the lesion, as in fibrous dysplasia, depends on the relationship of fibrous tissue to newly formed osteoid and bone. A subclassification may be made, restricting the term "ossifying fibroma" to almost completely radiolucent lesions containing little bone, designating as "osteoid osteoma" those that contain masses of uncalcified matrix and show a uniform radiopaque appearance, whereas "fibro-osteoma" can be applied to coarsely

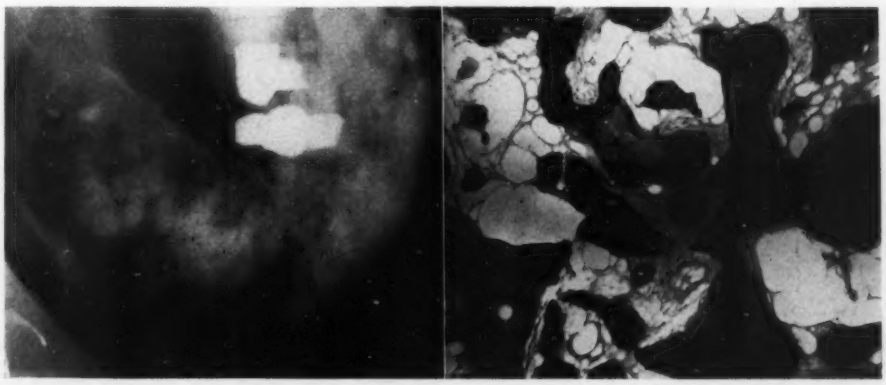


Fig. 7 (Case 7)—Left: Bilateral fibrous dysplasia of mandible of 50 year old woman. Right: Tumor specimen. Note massive trabeculae and small amounts of fibrous tissue

mottled lesions with massive deposit of well-calcified bone. Ultimately the tumor may become a true osteoma. It is well known that in some of these tumors cementum is laid down in addition to bone. For such tumors, Cahn[10] has coined the name "cementifying fibroma," though I prefer to classify them as "odontogenic fibroma."

TREATMENT—The treatment of ossifying fibroma is excision at the earliest time possible. Excision is especially satisfactory if the tumor is completely encapsulated and can be shelled out *in toto* or in sections. The insertion of absorbable gelatin sponge into the cavity promotes bone repair. This treatment is possible in most instances when the fibroma occurs in the mandible. A typical maxillary case has been reported by Heatly.[11]

REPORT OF CASES—The following cases are reported for illustration.

Case 9 (Fibro-Osteoma)—A fibro-osteoma of the mandible which occurred in a 19 year old girl is an excellent example of a fibro-osteoma (Fig. 9). It was a slightly trabeculated, expansive, encapsulated lesion which did not infiltrate the adjacent bone. This case is reported through the courtesy of Edward Sleeper.

Fig. 8 (Case 8)—Fibrous dysplasia of mandible and neck of condyloid process in girl 28 years old

Fig. 9 (Case 9)—Fibro-osteoma of mandible. (Illustration courtesy of Edward Sleeper)

Case 10 (Ossifying Fibroma of Mandible—A 13 year old white boy exhibited a tumor at the angle of the mandible. It was diagnosed by his physician as a cyst, but actually was a solid tumor which could be enucleated (Fig. 10, left). Examination showed that it consisted of connective tissue cells in a collagenous matrix with osteoclastic activity, noted in regions where irregular islands of new bone were found (Fig. 10, right).

Case 11 (Ossifying Fibroma of Mandible)—An excellent example of an ossifying fibroma was reported by Thoma, Hol-

10. Cahn, Lester R. Jaws in generalized skeletal disease; Charles Tomes Lecture. Ann. Roy. Coll. Surgeons England 8:115 Feb. 1951.

11. Heatly, C. A. Tumors of the maxillary sinus. Oral Surg., Oral Med. & Oral Path. 5:1253 Dec. 1952.

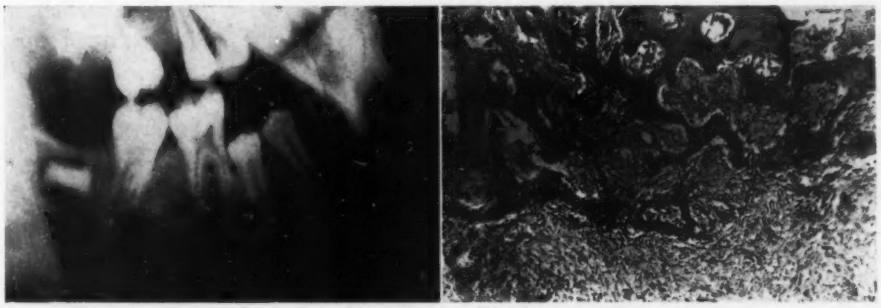


Fig. 10 (Case 10)—Left: Ossifying fibroma of mandible in 13 year old boy. Right: Tumor specimen

land and Rounds[12] in 1947. It was a well-circumscribed lesion containing bone, and occurred in an 18 year old girl. It was well-encapsulated and could be shelled out *in toto*.

Case 12 (Ossifying Fibroma of Mandible)—This is an osteolytic lesion which appeared to involve the apexes of two sound bicuspids in a 46 year old patient (Fig. 11, left). The tumor could be removed without disturbing the teeth. The pathologic examination showed a very cellular marrow with formation of atypical new bone trabeculae (Fig. 11, center). The roentgenogram taken eight months later is shown in Figure 11, right. This case is reported through the courtesy of Max Jacobs.

Case 13 (Odontogenic Fibroma of Mandible)—A boy five years old was referred to me by D. B. Talley[13] in 1952.

12. Thoma, K. H.; Holland, D. J., and Rounds, C. E. Miscellaneous case reports. Am. J. Orthodont. & Oral Surg. (Sec. Oral Surg.) 33:351 May 1947.

13. Talley, D. B. Familial fibrous dysplasia of jaws. Oral Surg., Oral Med. & Oral Path. 5:1012 Sept. 1952.

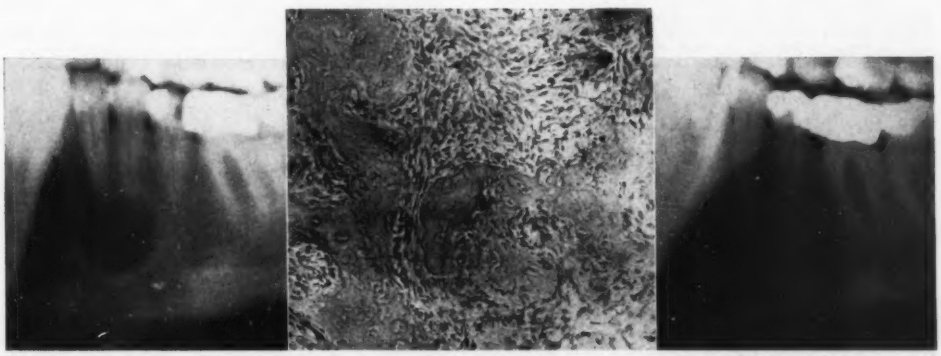


Fig. 11 (Case 12)—Left: Ossifying fibroma of mandible. Center: Tumor specimen. Right: Postoperative view of mandible. (Illustrations courtesy of Max Jacobs)

He had examined the lesion and had reported the case under the heading of fibrous dysplasia of the jaws. The anterior part of the mandible was involved and was greatly enlarged. I excised the lesion on September 4, 1952, and had the patient irradiated with 900 r in divided doses. The treatment, however, did not prevent prompt recurrence. The patient returned in January 1953, with a tumor of much larger size which distorted the dental arch and caused great disfigurement. A resection of the mandible was performed, leaving but a small span of bone derived from the lingual cortex. When a rib graft was inserted nine months later, there was no evidence of recurrence.

Microscopic study showed a very cellular stroma in which islands of cementum were deposited. The final diagnosis was odontogenic fibroma. The mother of the boy had multiple cementomas in her mandible but they had caused no deformity. The case may be found described[14] much more fully in an earlier publication.

■ *Summary*

Methods of clinical differentiation have been described which should help to classify fibro-osseous lesions of the jaws into instances of fibrous dysplasia and instances of neoplastic nature. The latter may be named ossifying fibroma or fibro-osteoma.

It has been pointed out that it is difficult to distinguish between fibrous dysplasia and ossifying fibroma by pathologic examination.

In fibrous dysplasia, the entire bone or a great part of it may be involved. The process, when it affects the middle face, tends to involve adjacent bones. This is due to faulty osteogenesis, the cells failing to differentiate into mature osteoblasts. Immature and abnormal intercellular substances are excreted, producing a weakness which is compensated for by more profuse cell activity, causing an enlargement and distortion of the affected part.

In ossifying fibroma, the young connective tissue cells, which are the ancestors of the osteoblast as well as the cementoblast, form a neoplasm by proliferating and forming a tumor mass, which encroaches on adjacent normal bone. By osteoclastic resorption, space is made for the lesion in the bone, and later its further development causes localized expansion. The periphery may show invasion of the adjacent marrow spaces, although in most instances encapsulation by a fibrous membrane and cortical bone is found. In some instances, the tumor cells lay down osteoid, and in others, bone trabeculae are formed, and occasionally cementicles.—*1180 Beacon Street.*

14. Thoma, K. H. Oral pathology, ed. 4. St. Louis, C. V. Mosby Co., 1954, p. 1199.

■ Books

We ought to regard books as we do sweetmeats, not wholly to aim at the pleasantest, but chiefly to respect the wholesomest; not forbidding either, but approving the latter most.—*Plutarch.*

Surgical treatment of precancerous lesions of the lip

■ *Bruno W. Kwapis,* D.D.S., M.S., St. Louis, and Malcolm J. Gibson, D.D.S., Port Huron, Mich.*

It has been well established that one of the most important factors in cancer control is an early diagnosis and eradication of benign lesions which predispose to malignant transformation. This paper is concerned with the diagnosis and surgical treatment of diffuse precancerous lesions of the lip. An operation is described that permits the removal of large areas of involved labial mucosa with optimum cosmetic restoration.

■ *Clinical Features*

The mucosal changes that are considered to have malignant proclivity include: dryness, chronic chapping, persistent fissures and cracks, scars, chronic cheilitis, senile keratosis and leukoplakia. Of these, senile keratosis and leukoplakia are considered to be the most important precursors to neoplasia. The senile keratotic lesion clinically exhibits an adherent crust formation which, when rubbed off, is followed by recurrence. This property of recurrence and persistence, together with microscopic features, is the main reason for considering the lesion a premalignant one. On the lip a keratotic lesion occurs either as a small single lesion, as multiple solitary ones, or it may be diffuse in appearance.

Leukoplakia as first seen is a diffuse milky bluish white film over the mucous membrane. If the causative factors of these lesions continue unchecked, the regions involved become thickened, more dense and whiter in appearance. These patches may persist without further changes; however, fissures and cracks with ulceration may develop and be the sites of malignant alterations. Schreiner[1] found carcinoma accompanying leukoplakia of the lower lip in 2.6 per cent of his cases, while Martin,[2] found the correlation to be as high as 28 per cent. A leukoplakia which develops rapidly is more likely to become malignant than one of the chronic variety.[3] All these tissue changes occur far more frequently on the lower than on the upper lip. Approximately 98 per cent of all these lesions have been observed in men.[4]

■ *Etiology*

The alterations of the labial mucosa with malignant potential represent a response to some form of chronic irritation, and the chronicity is usually more important than the type of irritant. Apparently

*Assistant professor and director, department of oral surgery, School of Dentistry, St. Louis University.

1. Schreiner, B. F., and Christy, C. J. Results of irradiation treatment of cancer of the lip. Radiology 39:293 Sept. 1942.
2. Martin, H.; MacComb, W. S., and Blady, J. V. Cancer of the lip. Ann. Surg. 114:226 Aug.; 114:341 Sept. 1941.
3. Ward, Grant E., and Hendrick, J. W. Diagnosis and treatment of tumors of the head and neck (not including the central nervous system). Baltimore, Williams & Wilkins Co., 1950, p. 226.
4. Martin, Hayes. Cancer of the head and neck. Early recognition of cancer no. 2. American Cancer Society, 1949, p. 16.

certain persons, primarily those of light complexion, possess an abnormally sensitive skin and mucosa that is more susceptible to weather exposure, particularly to actinic rays. These individuals are said to be predisposed to precancerous and cancerous lesions. Figi,[5] found exposure to sun and wind to be the foremost irritating factor. The use of tobacco and tobacco smoking has long been suspected as contributing to mucosal changes of the lip; however, Ackerman[6] places little emphasis on this as a causative factor. The tearing of the superficial layers of the lip mucosa by cigarette paper should not be overlooked as a source of irritation. Sharp,[7] in an analysis of a large group of lip cancers noted six instances in which there were scars from previous burns on the lip.

■ *Pathology*

The term precancerous, as applied to these lesions, connotes the relative probability of malignant transformation. At present there is no positive histologic method of determining with certainty which one of a given series of such lesions is destined to become malignant. There are, however, certain histologic features found in the diseased tissue which justify concern; namely, epithelial changes including hyperkeratosis and parakeratosis of the stratum corneum, acanthosis of the stratum germinativum and dyskeratosis (Fig. 1-4). The latter is interpreted as a cellular alteration of the orderly maturation of the cells of the basal layer in their successive layers.[8] Dyskeratosis is the most conclusive finding indicative of possible malignancy. Its presence without breakage through the retaining basal layer is referred to by some as "carcinoma *in situ*." A breakdown of the basal layer with cellular invasion of the subepithelial tissue denotes malignancy.

Another important fact that must be included in the discussion of pathogenesis and treatment of precancerous lesions is their multicentric origin. Slaughter[9] recently published some interesting findings on this subject. In a histological study of a large number of oral carcinomas by serial sections of whole surgical specimens, he was able to demonstrate the presence of abnormal and hyperplastic, often atypical epithelium surrounding the tumor for varying distances beyond that which was clinically discernible as the safe margin. Furthermore, in instances in which the tumor was 1 cm. or less in diameter, separate foci of *in situ* cancer or isolated islands of squamous cell carcinoma were found. This might explain part of the high rate of local recurrence of oral and labial carcinoma. With this information in mind, treatment of premalignant lesions should be surgical, with the operation designed to remove all diseased mucosa by a wide margin.

■ *Treatment*

The preventive aspect of the treatment is extremely important. Susceptible individuals, whose occupation demands their constant exposure to the outdoor ele-

5. Figi, F. A. Epithelioma of the lower lip; results of treatment. Surg., Gynec. & Obst. 59:810 Nov. 1934.

6. Ackerman, L. V., and Regatto, Juan A. del. Cancer, diagnosis, treatment and prognosis. St. Louis, C. V. Mosby Co., 1954, p. 231.

7. Sharp, G. S. Cancer of the lip. Oral Surg., Oral Med. & Oral Path. 1:516 June 1948.

8. Bernier, J. L. The management of oral disease; a treatise on the recognition, identification, and treatment of diseases of the oral regions. St. Louis, C. V. Mosby Co., 1955, p. 56.

9. Slaughter, D. P.; Southwick, H. W., and Smejkal, W. "Field cancerization" in oral stratified squamous epithelium: clinical implication of multicentric origin. Cancer 6:963 Sept. 1953.

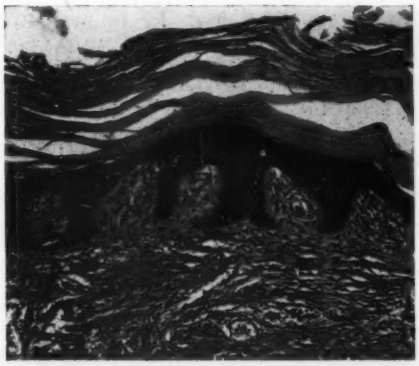


Fig. 1—Atrophic squamous epithelium with a thick keratotic layer covering the connective tissue which displays a moderate amount of chronic inflammation of its papillae. Diagnosis: flat keratosis

Fig. 2—Excessive hyperkeratotic and parakeratotic layer covering the stratified squamous epithelium. The latter shows acanthotic elongations into the densely lymphocytically infiltrated subepithelial tissues. There are keratinized bodies within the stratified epithelium. Diagnosis: keratosis

Fig. 3—Thick parakeratotic layer covering an acanthotic stratified squamous epithelium which protrudes into the subepithelial tissues. Diagnosis: keratosis

Fig. 4—Large mass of hyperkeratotic and parakeratotic tissue that extends over a limited area of stratified squamous epithelium. This epithelial layer exhibits acanthosis into the subepithelial tissue, which is densely infiltrated by plasma cells. In some areas the basal cell layer is missing and in these places squamous epithelial cells with mitotic divisions infiltrate the stroma. Diagnosis: keratosis with early neoplasia

ments, should be protected. The application of protective creams and salves should be advised. Labial mucosa that exhibits unusual dryness should be kept soft and pliable through the use of softening ointments.

Although roentgen ray irradiation is effective in the treatment of lip carcinoma, it appears to be of little value in the management of the precancerous lesions described here. When mucosal changes reach a stage that does not respond to conservative therapy, surgical excision is indicated. When the lesion is small and solitary, its removal presents no problem, but when the lesions are multiple or diffuse, removal with satisfactory restoration is a more difficult problem. A procedure will be described which gave gratifying results in 35 patients.

The operation employed was described as early as 1892 by Esmarch and Kowalzig[10] and more recently by other authors.[11,12] It has been termed a "lip shave" or "lip stripping" procedure (Fig. 5-7). The operation can be performed under either general or local anesthesia, but when using the latter, the infiltration technic is preferable to block anesthesia. The infiltration technic has the added advantage of providing hemostasis by the action of the incorporated vasoconstrictor in the anesthetic solution.

The surgical technic consists of making a linear incision extending to the corners of the mouth and either within or parallel to the mucocutaneous junction of the lip. For esthetic purposes it is very important that this incision follow closely the contour of the vermilion border. If the lesion extends to or beyond the mucocutaneous junction, then the incision should be carried into the normal skin with a safe margin.

A second incision is made through the mucosa, joining the two ends of the first incision at the corners of the mouth. This forms an elliptical outline circumscribing the labial mucosa and involved regions (Fig. 8, B). In regions that are suggestive of early neoplasia, the incision should be made wider and deeper, to include muscle tissue at least.

The second step in the operation is to undermine and dissect free the mucosa from the underlying tissues. It is at this stage that the terminal branches of the inferior labial arteries may be encountered and their ligation required. After the mucosa is excised (Fig. 8, C), a mucosal flap is prepared for covering the wound. This is done by undermining carefully the remaining inner labial mucosa (Fig. 8, D). A pair of fine iris scissors and skin hooks should be employed to decrease trauma to this relatively delicate flap of tissue. Fairly extensive undermining of the mucosal flap is necessary so that when it is advanced forward into position there will be a minimum amount of tension, an excess of which, if present, will restrict circulation and possibly distort the lip contour after healing.

After mobilization of the mucosal flap, it is advanced forward and the free edge approximated to the leading edge of the cutaneous incision by multiple interrupted no. 00000 black silk sutures (Fig. 8, E). The operator may note that the

10. von Esmarch, F., and Kowalzig, E. Chirurgische technik. Kiel, Lipsius & Tischer, 1892.

11. Erich, J. B. Treatment of carcinoma of the lips. Oral Surg., Oral Med. & Oral Path. 1:505 June 1948.

12. Barsky, A. J. Principles and practice of plastic surgery. Baltimore, Williams & Wilkins Co., 1950, p. 269.

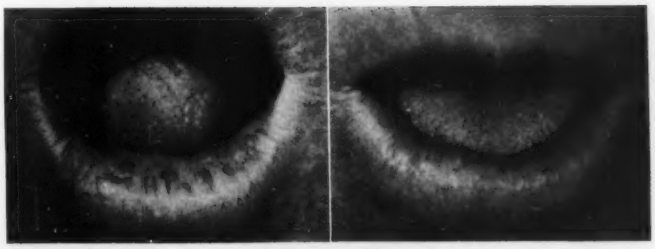


Fig. 5 — Left: Preoperative view showing areas of multiple focal keratosis of the lower lip in 55 year old white man. Right: Appearance of same lip six months after a lip shave procedure

Fig. 6 — Left: Preoperative view showing diffuse area of senile keratosis in 56 year old white man. Microscopic examination of surgical specimen disclosed presence of incipient neoplasia. Right: Postoperative appearance after two months

Fig. 7 — Left: Preoperative view showing diffuse rapidly developing leukoplakia in 37 year old white man. Right: Postoperative appearance of lip after five weeks

normal pink color of the mucosal flap has changed to a cyanotic blue, but this condition should not be viewed with alarm as it only signifies a transient ischemia. The blue color will fade after revascularization of the tissue occurs, which usually takes place on the second or third postoperative day. The accumulation of blood beneath the flap is considered undesirable because it prevents good adaptation of the mucosa to the underlying tissues and subsequently may delay healing. If blood is evident, then several small stab incisions should be made into the flap for drainage. The use of a pressure dressing in this region is not practical. Postoperative application of an ice bag to the lip should be routine.

Soon after the operation, the lip swelling and protrusion results in a decrease or complete absence in moistening of this region by the tongue. Oral mucosa must be kept moist for survival, especially when circulation has been impaired, otherwise it may slough. To prevent this dehydration, continuous application of wet normal saline dressings is imperative, and for the same reason, the patient is instructed to apply an ointment, such as petrolatum to the lip prior to retiring at night. If wound healing is uneventful, alternate sutures

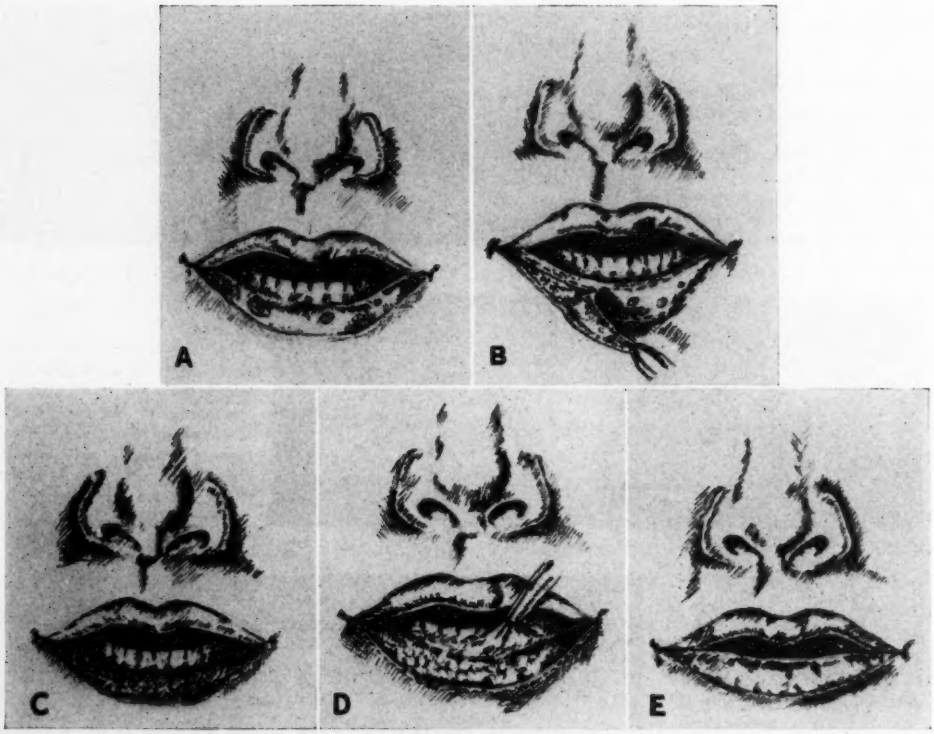


Fig. 8—Mucosal lesion and steps in lip shave operation

Fig. 9—Left: Patient with keratotic changes and epithelioma of lower lip. Center: Appearance of sutured wound after combination "V" excision and lip shave operation. Right: Postoperative appearance of lip, two months after suture removal

are removed on the fourth postoperative day and the remaining sutures on the sixth day.

Many patients with an epithelioma of the lower lip may also have thickened patches of leukoplakia or keratoses in other areas of the lip, and a combination of the operation already described with the classical "V" excision will result in equal cosmetic success (Fig. 9).

■ *Summary*

1. The importance of early diagnosis and eradication of precancerous lesions of the lip as a means of cancer control cannot be overstressed.

2. There are certain clinical features of two important precancerous lesions, keratoses and leukoplakia, which should be recognized.

3. The most important etiologic factor in premalignant changes of the labial mucosa appears to be exposure to weather.

4. The presence of dyskeratosis without breakage through the retaining basal layer is referred to by some as "carcinoma *in situ*." A breakdown of the basal layer with cellular invasion of the subepithelial tissue denotes malignancy. The multicentric origin of precancerous lesions must be remembered when pathogenesis and treatment of such lesions is being considered.

5. An operation, termed "lip shave," which permits complete removal of the diseased labial mucosa with good cosmetic restoration has proved successful.

Surgical closure of the oroantral fistula

■ *Daniel M. Laskin, D.D.S., M.S., and Irwin B. Robinson, D.D.S., M.S., Chicago*

Most of the difficulty encountered in closure of oroantral fistulas arises from a failure to apply certain basic surgical principles in the preoperative and operative management of the patient. The first requisite for a successful closure is the absence of infection in the maxillary sinus. Such infection usually can be treated by the administration of antibiotics systemically and by antral irrigations through either the natural ostium or the fistulous opening. In instances in which the infection persists despite these procedures, it may be necessary to establish drainage through a nasoantral window and, occasionally, to remove the diseased sinus membrane by the Caldwell-Luc operation.

When the sinus has been rendered free of infection, closure of the oroantral fistula can be accomplished readily by means of a properly designed tissue flap which has an adequate blood supply and is free from excess tension. Although a great deal of emphasis has been placed on the method of constructing such flaps, little attention has been given to the preparation of a satisfactory site for their reception. Success of the operation depends

From the department of oral and maxillofacial surgery, University of Illinois College of Dentistry.

equally on these two factors since, ultimately, the flap must obtain a portion of its blood supply from the region to which it is transplanted. It is the purpose of this paper to describe an improved method for providing such an adequate soft tissue base.

■ *Technic of Antral Closure*

Anesthesia is obtained by blocking the maxillary division of the trigeminal nerve through the posterior palatine foramen. Local infiltration is avoided because of the adverse effects of the vasoconstrictor in the solution on the regional blood supply.

The size of the flap to be constructed depends on the distribution of teeth in the region. The broadest possible base should be provided, in order to assure sufficient vascularity for the flap during the period of reattachment.

The technic employed is a modification of that originally described by Berger[1]. A horizontal incision through the mucoperiosteum is made in an anteroposterior direction along the buccal aspect of the antral opening. The sides of the flap are completed by making diverging incisions from each end of the initial incision extending upward across the alveolar process and outward and downward into the cheek (Fig. 1, above left and right). These incisions are carried through the alveolar periosteum but only include the mucosal layer in the buccal region. The mucoperiosteal portion of the flap is elevated to the level of the gingivobuccal fold. At that point the periosteum continues upward along the surface of the maxilla while the mucosa turns downward to line the inner surface of the cheek (Fig. 1, above right). To allow greater mobility of the flap, the periosteum must be incised in this region. This is an extremely important step in the procedure since it releases tension on the flap, and allows it to be sutured over the fistula with ease. If additional length of tissue is necessary, the dissection of the mucosal layer only is continued downward along the cheek (Fig. 1, above right). It is obvious that further upward extension cannot increase the size or mobility of the flap; therefore, upward extension is unnecessary. The base of the flap seldom reaches the level of Stensen's duct and is always superficial to that structure.

When the flap is of sufficient size and mobility that it can be carried across the opening without undue tension, preparation of the recipient site is begun. Rather than remove the entire mucoperiosteum in the region adjacent to the oroantral fistula as suggested by some authors,[1,2] in the present method, only the epithelium is shaved off with a sharp, pointed scalpel. In this manner a boxlike preparation lined with fresh connective tissue is created extending onto the palatal side of the alveolar process for at least 5 mm. beyond the edge of the opening (Fig. 1, above right). The flap is then reshaped, if necessary, and is carefully sutured to this area with no. 000 silk suture (Fig. 1, below left and right). At the palatal margin the sutures should extend through the submucosa of the recipient site, in order to provide broad surface contact

1. Berger, A. Oroantral openings and their surgical correction. Arch. Otolaryng. 30:400 Sept. 1939.

2. Wallner, Linden J. Treatment of oroantral fistula. A.M.A. Arch. Otolaryng. 55:666 June 1952.

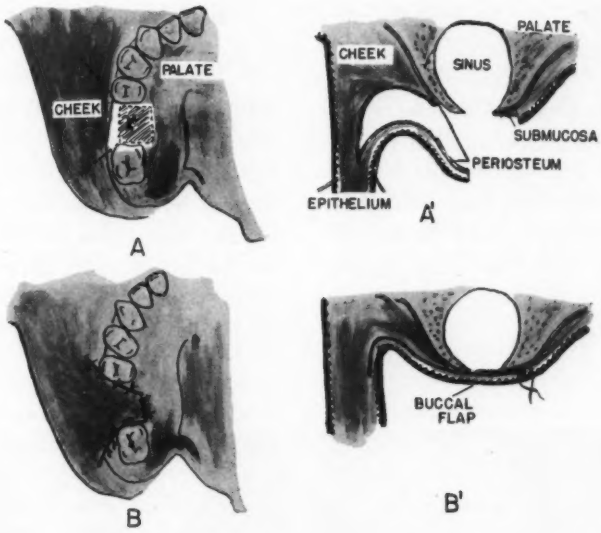


Fig. 1—Diagrams of modified buccal flap technic for closure of oroantral fistula. Above left: Palatal view outlining design of buccal flap. Note wide divergence of incisions, which provides broad base and insures vascularity of tissue. Above right: Coronal view showing site where periosteum is incised, downward extension of flap into cheek and prepared submucosal bed on palate. Below left: Palatal view of buccal flap sutured into position. Below right: Coronal view showing closure of antral opening. Note that margin of flap is resting on bone

rather than edge-to-edge approximation (Fig. 1, below right).

It is recommended that antibiotics be administered systemically for at least three days postoperatively. The sutures are allowed to remain for one week. Usually there is only slight swelling of the cheek and little, or no, associated pain. The patient should be advised to apply intermittent cold compresses to the face during the first 24 hours. Subsequently, moist heat is used if extraoral swelling persists. Generally, by the third day, the edema will have subsided completely.

The periodic use of warm saline mouthwashes should be started on the second day. Vigorous rinsing, however, must be avoided. The patient should also be instructed to refrain from any action which will cause undue pressure or tension on the flap, such as blowing the nose or sneezing with the mouth closed. The nose can be kept clean with moist cotton applicators and ephedrine nose drops may be prescribed to help maintain a patent airway and to facilitate drainage of the maxillary sinus. A soft, nonchewy diet should be eaten. Proper postoperative care on the part of the patient is extremely important in determining the ultimate success of any antral closure.

The modified buccal flap procedure has

been used successfully in 23 patients at the department of oral and maxillofacial surgery, University of Illinois College of Dentistry. No technical difficulties were encountered, even in instances in which only one tooth was missing in the region. Surgery was initiated in some instances shortly after occurrence of the fistula and in others as long as six years later. In no instance has there been any evidence of recurrent antral disease.

■ *Comment*

Flaps for the closure of an oroantral fistula can be obtained from either the cheek or palate. The palatal flap is preferred by some because its vascularity is insured by the anterior palatine artery. On the other hand, buckling of the tissue due to the necessity of rotating the flap into position may be a factor in reducing this blood supply. Buckling also presents

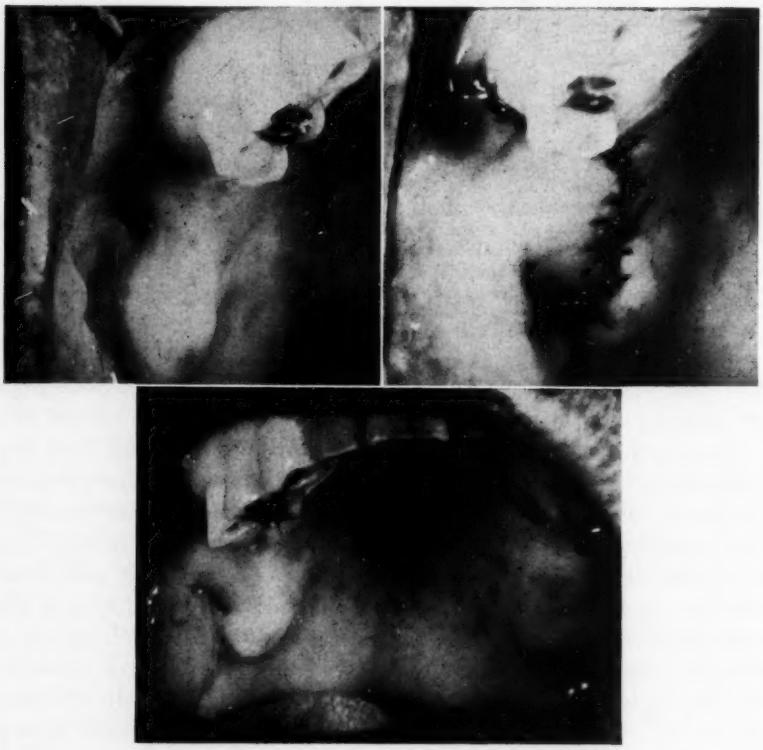


Fig. 2—Above left: Preoperative view of chronic oroantral fistula on buccal aspect of edentulous ridge. Above right: Postoperative view showing buccal flap sutured into position. Note that flap was carried over onto palatal side of alveolar ridge to provide solid bony base for tissue and wide area for reattachment. Below: Appearance of buccal flap one month after surgical intervention

a problem in restoration of palatal contour. The greatest disadvantage of this particular method, however, lies in the fact that a large area of the palate is left denuded. Considerable time is required for this defect to become re-epithelized and, in the interim, there is a possibility of infection of the exposed bone.

These disadvantages are overcome in the properly constructed buccal flap. Since the tissue is obtained directly opposite the antral opening, no rotation is necessary. All portions of the wound are covered by mucous membrane so that the postoperative course is shortened and the chances for complications are less. The possibility of obliteration of the gingivobuccal fold with resultant difficulty in wearing a prosthesis is no problem since it has been our experience, as well as that of others,[1, 2] that the contracture during the healing process tends to return the tissues to their original position and that little, or no, change in the depth of the fold occurs (Fig. 2).

The factors to be considered in the successful construction of a buccal flap are similar to those for flaps in general. First, in order to assure an adequate blood supply, the base should be as broad as possible. Second, the tissue should be free from all undue tension. Third, there should be bony support for the sutured margins. Last, a vascular bed must be provided for attachment of the flap. This is more readily achieved by shaving off the epithelium from the palatal margin of the wound than by excising the tissue down to the bone or by placing the flap under the palatal mucosa. If these principles are observed, in addition to those outlined for the proper preoperative and postoperative care of the patient, a high degree of success can be achieved in the treatment of the oroantral fistula.

■ *Summary*

A modified method for preparation of the recipient site in oroantral closure by the buccal flap technic is presented. Allowing a broad area of connective tissue to remain on the palatal aspect of the alveolar process provides a better vascular supply for the flap and favors its successful attachment.

■ Art of Reading

Learn to be good readers, which is perhaps a more difficult thing than you imagine. Learn to be discriminative in your reading; to read faithfully, and with your best attention, all kinds of things which you have a real interest in . . . and which you find to be really fit for what you are engaged in.—*Carlyle.*

Treatment of extravasation cysts with freeze-dried homogenous bone grafts

■ *Philip J. Boyne, D.M.D., Washington, D. C.*

The treatment of extravasation cysts has long consisted of surgical exposure of the cystic cavity, evacuation of any fluid contents, curettage of any soft tissue remaining on the cavity walls, and closure of the mucoperiosteal flap.[1-4] This exposure of the cystic cavity and the filling of the cystic space with a fresh blood clot that is in primary contact with the reactive connective tissue of the repositioned mucoperiosteal flap,[4] apparently leads to uneventful healing and eventual replacement of the bone cavity with a normal osseous structure. In addition to simple surgical closure of the mucoperiosteum, efforts have been made to assist the granulation and osteogenic process by treating the cystic cavity with absorbable[1, 5] and nonabsorbable agents,[6-10] and with frequent postoperative irrigations of the operative site.

Although the results of these surgical procedures have for the most part been satisfactory, it was felt that grafts of banked freeze-dried homogenous bone,[11] which have been employed successfully in the surgical treatment of dentigerous and radicular cysts,[12] might be utilized to produce a more efficacious restoration of the bone structure.

It has been shown by Cooksey[12] that the placement of freeze-dried cancellous and cortical chips in the defects after the enucleation of dentigerous and radicular cysts appears to effect a rapid return to normal of the osseous tissue.

In addition, Cooksey[12] has reported one instance of a traumatic cyst of the mandible which was treated successfully with a freeze-dried bone graft. Roentgenograms taken four months postoperatively demonstrated an almost complete obliteration of the cystic defect through resorption of the graft material and its replacement by normal cancellous bone.

Clinically, these grafted areas heal without incident, and the fragments of

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

Lieutenant Commander, Dental Corps, U. S. Navy, Dental Service, Naval Dispensary, Navy Department.

1. Thoma, K. H. Treatment of extravasation cysts with the use of gelfoam, Oral Surg., Oral Med. & Oral Path. 8:950 Sept. 1955.

2. Jacobs, M. H., and Stone, Harry. Cysts of the jaws. Am. J. Orthodont. & Oral Surg. 26:690 July 1940.

3. Jacobs, M. H. Traumatic bone cyst. Oral Surg., Oral Med. & Oral Path. 8:940 Sept. 1955.

4. Olech, E.; Sicher, H., and Weinmann, J. P. Traumatic mandibular bone cysts. Oral Surg., Oral Med. & Oral Path. 4:1160 Sept. 1951.

5. Austin, E. U. Hemorrhagic extravasation cyst of the mandible. Oral Surg., Oral Med. & Oral Path. 8:958 Sept. 1955.

6. Ivy, R. H., and Curtis, L. Hemorrhagic or traumatic cysts of the mandible. Surg., Gynec. & Obst. 65:640, 1937.

7. Lazansky, J. P.; Wuehrmann, A. H., and Glickman, I. Traumatic cyst of the mandible. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 32:155 March 1946.

8. Bennett, I. B., and Chilton, N. W. Traumatic cysts of the mandible: report of case. J.A.D.A. 32:51 Jan. 1945.

9. Blum, T. H. Unusual bone cavities in the mandible: a report of three cases of traumatic bone cysts. J.A.D.A. 19:281 Feb. 1932.

10. Whinery, J. G. Progressive bone cavities of the mandible. Oral Surg., Oral Med. & Oral Path. 8:903 Sept. 1955.

11. Kreuz, F. P., and others. The preservation and clinical use of freeze-dried bone. J. Bone & Joint Surg. 33A:863, 1951.

12. Cooksey, D. E. Clinical and animal experiments to investigate the healing properties of freeze-dried bone materials in cysts of the jaws. Thesis, Graduate School of Georgetown University, 1954.

the graft do not tend to be extruded or exfoliated from the operative site. Roentgenographic evidence indicates early osteogenic activity with eventual replacement of the graft with normal viable bone.

The chief advantage of utilizing freeze-dried homogenous bone grafts in dentigerous and radicular cystic defects is that it eliminates periods of postoperative treatment of the region. Residual defects and deformities remaining after ordinary surgical enucleation are also avoided, and normal contour is maintained. In addition, a prosthetic appliance usually can be constructed immediately after surgical treatment, without the necessity of fabricating an obturator. Early repair of cystic regions appears to proceed more rapidly than with simple surgical excision, pneumatization or exteriorization.

Although the propensity of many extravasation cysts to heal rapidly without incident after exposure, curettage, and closure apparently obviates the necessity of utilizing a homogenous bone graft to effect rapid healing, it was felt that an effort should be made to determine the efficacy of this material in the treatment of the traumatic bone cysts.

Two instances of extravasation cysts of the mandible were treated by surgical exposure and exploration of the lesion followed by placing of a freeze-dried homogenous bone graft. The graft material, consisting of cancellous bone chips, had been prepared by the Tissue Bank of the Naval Medical School, National Naval Medical Center, Bethesda, and the process of freeze-drying as described by Kreuz[11] and co-workers was utilized. The bone was reconstituted in normal saline solution for five minutes prior to insertion into the cystic cavities. It has been shown that the freeze-dried material actually may be reconstituted to its previous physical properties with any fluid which is physiologically and osmotically acceptable; that is, normal saline solution, plasma, or the patient's own blood.[11]

■ *Case 1*

COMPLAINT AND HISTORY—The patient, an 18 year old negro Marine corporal was admitted to the U. S. Naval Hospital, Bethesda, Md., on June 6, 1955, with the diagnosis of bone cyst of the left side of the mandible of undetermined origin. The patient complained of episodes of dull pain over the angle of the mandible on the left side. On several occasions, during the six months preceding his admission, he had noticed a slight swelling of the alveolar ridge in the left third molar region. These swellings persisted approximately 2 or 3 days with spontaneous remission.

The patient gave a history of having been "struck on the jaw" several times while participating in high school football contests. The past and family history was otherwise noncontributory.

EXAMINATION—Examination revealed a young negro man in no apparent distress. Intraoral examination disclosed an extensively carious third molar on the left side of the mandible which was fully erupted. There was a slight bulging of the lateral surface of the mandible inferior to the left third molar. Oral examination was otherwise negative; general physical examination was likewise noncontributory. Roentgenographic studies revealed a large radiolucent area inferior to the apexes of

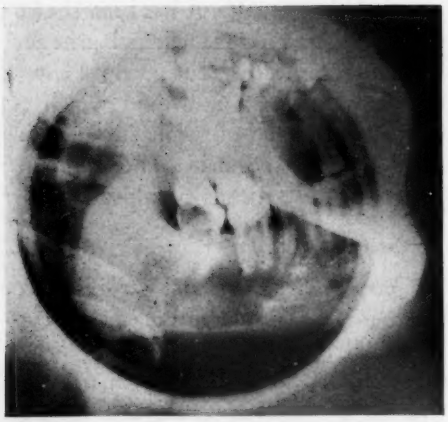


Fig. 1—Case 1. Preoperative roentgenogram of left side of mandible revealing large irregular radiolucent area apparently involving the apexes of second and third molars and extending inferiorly to lower border of mandible

the mandibular second and third molars on the left side (Fig. 1). This radiolucent area extended inferiorly to the lower border of the mandible, posteriorly to the ascending ramus, and anteriorly to the mesial root of the second molar. A few small septums of bone appeared to traverse the defect, the margins of which in some areas were not clearly demarcated. The third molar on the left side of the mandible failed to respond to electric vitality tests, but the response of all other teeth was within normal limits.

LABORATORY EXAMINATION—Laboratory examination in the form of bleeding and coagulation time, urinalysis, red and white blood cell count and differential count were all within normal limits. The hemoglobin concentration was 15.4 Gm., serum calcium content was 10.2 mg. per hundred cubic centimeters and serum phosphorus, 3.2 mg. per hundred cubic centimeters. The Kahn test was negative, and a general skeletal roentgenographic bone series was within normal limits.

TREATMENT AND COURSE—On June 9, 1955, the patient was premedicated with 1.5 grains of secobarbital sodium, 1/6 grains of morphine and 1/150 grains of atropine. Under 2 per cent lidocaine conduction and infiltration anesthesia, the following operation was performed.

An incision was made through the gingival crevice of the third and second molars on the left side of the mandible and extended posteriorly to the fully erupted third molar. A vertical incision was made from the mesial surface of the second molar to the mucobuccal fold. The mucoperiosteum was elevated, and the buccal bone overlying the cystic defect was perforated in several locations with a surgical bur. The bur holes were connected, and the buccal cortex was removed revealing a large void in the cancellous bone which appeared to contain no soft tissue. Curettage of the cystic cavity, however, produced a small quantity of delicate fibrous tissue which was adhering to portions of the bony walls. This cystic void was also found to be traversed by two large bone septums.

The third molar was removed, and the cystic defect was explored further. The neurovascular bundle of the structures of the mandibular canal was found to cross the defect just below the apexes of the third molar roots. In order to preserve the continuity of the neurovascular bundle, only the lateral and posterior portions of the cystic region were filled with freeze-dried homogenous cancellous bone

chips, thus avoiding any impingement of the fragments of the bone graft on the mandibular vessels.

The mucoperiosteal flap was sutured back into its normal position with no. 000 interrupted monofilament nylon sutures.

The postoperative course was uneventful. Minimal facial edema was present on the day after the operation. No trismus was present. The second molar on the left side continued to respond normally to the electric pulp tester. The sutures were removed on the seventh postoperative day, and the patient was discharged to duty on June 19. The pathologist's report of the surgical specimen was as follows:

Gross: Specimen consists of a lower molar tooth presenting a large carious lesion. Also included are several fragments of bone with attached soft tissue having a total aggregate volume of 1 cc.

Microscopic: Histologic examination reveals delicate, loose, fibrous connective tissue in which there are numerous areas of calcification. Vital bone is also apparent. Although no hemosiderin-filled macrophages are seen, the histologic findings are compatible with, but not diagnostic of, a simple bone cyst.

Diagnosis: Compatible with extravasation cyst, mandible.

The patient came for a follow-up examination on September 6, 1955. Intraoral and extraoral roentgenograms taken at that time revealed a considerable reduction in the degree of radiolucency of the former cystic cavity (Fig. 2). Most of the fragments of the bone graft appeared to have been replaced by normal cancellous bone. The patient remained asymptomatic, and there has been no extrusion of bone graft fragments.

Fig. 2—Case 1. Low periapical roentgenogram taken three months postoperatively demonstrating uniformity of bone density between cancellous structure of former cystic defect and surrounding bone

■ *Case 2*

COMPLAINT AND HISTORY—The patient, a 21 year old first-class midshipman, was admitted to the U. S. Naval Hospital, Bethesda, Md. on June 7, 1955, for diagnosis and treatment of a radiolucent cystlike area on the right side of the mandible. The radiolucent area had been observed in periapical roentgenograms taken in the course of a routine dental examination at the Naval Academy.

Subjectively the patient was completely asymptomatic. The past history revealed that the mandibular third molar on the right side had been removed approximately four years previously. The patient stated that the tooth was "impacted" and that it had been removed with difficulty. The patient further stated that "x-rays" were taken prior to removal of the tooth, but that he had not been told by the dentist performing the extraction of any abnormality visible at that time roentgenographically. Interrogation of the patient regarding past facial trauma re-

Fig. 3—Case 2. Preoperative roentgenogram revealing diffusely outlined radiolucent area involving edentulous third molar region on right side and angle of mandible

vealed that he had participated in collegiate boxing during the previous three years.

The past and family history was otherwise noncontributory.

EXAMINATION—Examination revealed a young white man in no apparent distress. Intraoral examination revealed a full complement of teeth with the exception of the third molars. All teeth were caries free and responded within normal limits to the electric pulp tester. No intraoral swellings or abnormalities could be detected clinically, and no facial asymmetry was discernible. The general physical examination was likewise essentially negative.

Intraoral and extraoral roentgenograms demonstrated a large radiolucent area extending from the distal aspect of the second molar on the right side posteriorly to the ramus, superiorly to the crest of the alveolar ridge, and inferiorly to the lower border of the mandible (Fig. 3). The outline of the lesion appeared indistinct in many places.

LABORATORY EXAMINATION—Laboratory examination in the form of a urinalysis, bleeding and coagulation time, white blood cell count, red blood cell count and differential count were within normal limits. The hemoglobin concentration was 16.2 Gm. Serum calcium was 10.0 mg. per hundred cubic centimeters, inorganic phosphorus was 3.4 mg. per hundred cubic centimeters. Results of the Kahn test were negative, and a general skeletal roentgenographic bone series was likewise negative.

TREATMENT AND COURSE—On June 8, 1955, the patient was premedicated with 1.5 grains of secobarbital sodium, ⅛ grain of morphine and 1/150 grains of atropine. The following operation was performed:

Under 2 per cent lidocaine (with 1:50,000 epinephrine) inferior alveolar block and infiltration anesthesia, an incision was made at the cervical margin of the first and second molars on the right side and continued posteriorly over the edentulous third molar region following the external oblique ridge of the mandible. A vertical incision was made mesial to the first molar and was extended to the mucobuccal fold. The mucoperiosteum outlined by the incision was elevated, and the bone overlying the cystic defect was perforated in several areas with the surgical bur. The

multiple bur holes were connected and the cortical plate was thus fenestrated, exposing the cystic defect.

Exploration of the cystic region revealed a large cavity within the cancellous bone. It was completely devoid of all soft tissue. The neurovascular bundle of the mandibular vessels crossed the medial surface of the cavity. A bony shelflike septum extended over the anterior portion of the mandibular vessels.

A specimen of the cancellous bone curetted from the wall of the defect was taken for microscopic examination. A graft of freeze-dried homogenous cancellous bone was reconstituted in normal saline solution and placed within the upper portion of the cystic cavity. Care was taken not to place the graft material against the unprotected portion of the mandibular vessels. These vessels, together with a large bone septum, prevented the placement of the graft into the inferior part of the defect.

The mucoperiosteum was closed with no. 000 monofilament nylon sutures and the patient was returned to the ward in good condition.

Microscopic examination of the bone fragments curetted from the wall of the cavity revealed "vital" bone spicules containing fatty, loose fibrous connective tissue within the marrow spaces. A diagnosis of vital bone was made.

The postoperative course was uneventful. Only moderate facial edema was present on the day after the operation. This rapidly subsided and the patient became asymptomatic, and on June 17 he was discharged from the hospital and returned to duty. Monthly postoperative examination revealed no extrusion of any of the graft fragments and, from a clinical standpoint, healing was normal.

Fig. 4—Case 2. Lateral oblique roentgenogram taken three months postoperatively. There is uniformity of bone density throughout area of former cystic defect. A slight suggestion of radiolucency remains at inferior border of former cystic cavity

Roentgenogram taken three months postoperatively revealed apparent replacement of the homograft fragments by cancellous bone of the host (Fig. 4). The density of the operative site approximated that of the surrounding bone.

■ *Conclusions*

1. The use of freeze-dried homogenous bone grafts in the surgical treatment of extravasation or traumatic bone cysts of the mandible appears to effect rapid and uneventful clinical healing of the operative site.

2. Roentgenographic evidence indicates an early institution of osteogenic activity.

3. The replacement of the cystic cavity by normal osseous tissue in the relatively short period of three months, as indicated roentgenographically, appears to indicate that the treatment utilized may be superior to the usual method.

4. Proper evaluation of the efficacy of utilizing freeze-dried homogenous bone grafts as opposed to other commonly practiced surgical procedures in the treatment of extravasation cysts must await more extensive study.

Chlorpromazine hydrochloride as an antinauseant and tranquilizing agent—a preliminary report

■ *H. E. Young, D.D.S., and B. C. Kingsbury, Jr., D.D.S.,* Vallejo, Calif.*

Use of chlorpromazine hydrochloride in the treatment of nausea and the effecting of tranquilization have been widely reported in the medical literature.

A member of the phenothiazine series of drugs, chlorpromazine (10-(-3-dimethylaminopropyl)-2-chlorphenothiazine) possesses diverse and clinically useful pharmacologic properties. In studies to date it has been found to be of definite value in the control of nausea and vomiting,[1-3] for mental and emotional disturbances,[4-6] treatment of alcoholism,[7,8] intractable pain,[9,10] and hiccups.[11]

Numerous clinical studies have supported its use for the control of nausea and vomiting and attest to its effectiveness, especially after anesthesia.[12] Also its administration to relieve the emotional disturbances before and after anesthesia has had favorable clinical application. The adaptation of chlorpromazine to office anesthesia in dental and oral surgery has not been generally reported.

Since agents used in office anesthesia

*Associate professor of oral surgery, College of Physicians and Surgeons, San Francisco.

1. Friend, D. G., and Cummins, J. F. New antiemetic drug; preliminary report. J.A.M.A. 153:480 Oct. 1953.

2. Moyer, J. H., and others. Clinical studies of antiemetic agent, chlorpromazine. Am. J. M. Sc. 228:174 Aug. 1954.

3. Stewart, B. L., and Redeker, A. G. Emesis and hiccough—treatment with chlorpromazine. California Med. 81:203 Sept. 1954.

4. Winkelman, N. W., Jr. Chlorpromazine in the treatment of neuropsychiatric disorders. J.A.M.A. 155:18 May 1, 1954.

5. Lehmann, H. E., and Hanrahan, G. E. Chlorpromazine: new inhibiting agent for psychomotor excitement and manic states. A.M.A. Arch. Neurol. & Psychiat. 71:227 Feb. 1954.

6. Goldman, D. Treatment of psychotic states with chlorpromazine: J.A.M.A. 157:1274 April 9, 1955.

7. Albert, S. N., and others. The use of chlorpromazine in the treatment of acute alcoholism. Med. Ann. District of Columbia 23:245 May 1954.

8. Mitchell, E. H. Chlorpromazine in the treatment of acute alcoholism. Am. J. M. Sc. 229:363 April 1955.

9. Sadove, M. S., and others. Chlorpromazine and narcotics in the management of pain of malignant lesions. J.A.M.A. 155:626 June 12, 1954.

10. Lucas, J., and others. Thorazine as an aid in management of cancer patients. Proc. Am. A. Cancer Research 1:30 April 1954.

11. Friedgood, C. E., and Ripstein, C. B. Chlorpromazine (Thorazine) in the treatment of intractable hiccups. J.A.M.A. 157:309 Jan. 22, 1955.

12. Matthews, W. A.; Morris, G. C., Jr., and Moyer, J. H. Use of chlorpromazine in anesthesia. Am. Pract. 6:360 March 1955.

should be free from undesirable side effects, relatively nontoxic, and readily administered, chlorpromazine might be considered unsuitable. Yet close examination of published reports and clinical administration of the drug substantiate its good qualities and minimize the bad. The basis for such a conclusion rests in the fact that in most instances, its therapeutic effect generally can be attained in the dental field by single doses.

Reports of the occurrence of jaundice show that it results after multiple and prolonged administration and usually disappears after withdrawal of the drug.[13,14] The hypotensive action of the drug again is definitely more pronounced when high initial doses are given or after prolonged administration. In single doses of 25 mg., however, a relatively small drop in blood pressure may occur which lasts for less than an hour usually, and unless a patient's pressure is already low, no deleterious effects will be noted.[4] Twelve patients with varying histories were checked closely, and none experienced a drop of more than 15 per cent with systolic and diastolic pressures lowering proportionately. Once chlorpromazine is administered, epinephrine should not be given since the effect of chlorpromazine might be reversed. Norepinephrine may be used with chlorpromazine effectively for hypotension, or the patient's position may be adjusted so that the head is lowered and the legs raised.[15]

Chlorpromazine potentiates the effects of narcotics and analgesics; therefore, the dosages of the latter should be reduced. Clinical experience has shown that when a 2.5 solution of thiopental sodium is used for a patient who has been premedicated with 25 mg. of chlorpromazine either orally or intramuscularly, the barbiturate dose should be reduced about one third. The depressant action of alcohol is potentiated by chlorpromazine,[7,8] and caution is required when the two are combined.

■ *Scope*

This investigation was carried out over a period of several months in an attempt to compile data comprehensive enough to draw a reasonable conclusion as to the therapeutic effect of chlorpromazine both as a tranquilizing agent and as an antinauseant. The primary reason for observing the tranquilizing effect of the agent was to determine its value for children undergoing nitrous oxide analgesia.

To study the effect of chlorpromazine as an antinauseant, it was necessary to find those patients who showed signs of postoperative nausea after general anesthesia when thiopental sodium-nitrous oxide-trichloroethylene-oxygen was used.

■ *Tranquilizing Effects*

Preliminary tests demonstrated chlorpromazine should be administered orally 45 minutes to one hour prior to induction of anesthesia. A shorter lapse of time reduced its effectiveness at the time of induction. Once this clinical observation was established, all children aged 3 to 9 were given 10 mg. tablets of chlorpromazine[16] with a minimal amount of water on

13. Cohen, I. Effects of chlorpromazine in psychiatric disorders. Am. J. Med. Sc. 229:355 April 1955.

14. Kinross, Wright V. Chlorpromazine—a major advance in psychiatric treatment. Postgrad. Med. 16:297 Oct. 1954.

15. Foster, C. A., and others. Chlorpromazine—a study of its action on the circulation in man. Lancet 267 (6839):614 Sept. 25, 1954.

16. Thorazine—Smith, Kline and French Laboratories.

entering the office. At that time, their emotional state was observed and classified. The child and the parents were then asked to wait in the reception room for 45 minutes to one hour. After the lapsed time, the child was prepared in the operating room and the induction of the inhalant analgesia begun, and the child's emotional state was checked. Postoperatively, during recovery, the child was observed for the third time.

Thus, by checking each child when he initially entered the operating room, during induction and again during postoperative recovery, some relative conclusions could be drawn regarding the tranquilizing effect of chlorpromazine. The table shows the data for 67 children.

■ *Discussion of Tranquilizing Effects*

From the data in the table it can be observed that the administration of chlorpromazine definitely reduces the number of emotionally disturbed children during induction of analgesia and during the recovery period. Reduction of the number of emotionally disturbed children from 26 in the preoperative period to four during induction and two in the recovery period is convincing evidence of its effectiveness. It was observed that once chlorpromazine was administered to every child, their management was less difficult and their own experience was pleasanter than prior to the use of the drug. No nausea or vomiting was observed.

■ *Procedure for Observing Antinauseant Effects*

Each patient experiencing nausea or vomiting during recovery from the balanced general anesthesia was administered 25 mg. of chlorpromazine intramuscularly. The drug's therapeutic action was observed to be effective in most instances within ten minutes. Data for 29 patients experiencing postoperative nausea (1 severe; 11 moderate; 17 mild) ten minutes after intramuscular injection of 25 mg. of chlorpromazine were as follows: In the one instance of severe nausea the nausea became mild and ceased after the second injection one hour later; in the 11 with moderate nausea, ten had no nausea and one had mild nausea which ceased 20 minutes later; in the 17 who had had mild nausea there was no nausea present.

■ *Discussion of Antinauseant Effects*

Chlorpromazine gave profound relief in most instances after a lapse of only ten minutes. The drug also had a tranquilizing effect. In addition to the group of 29 patients mentioned, several other patients with histories of postoperative nausea were either given 25 mg. tablets prior to surgery or the same dosage intramuscularly immediately after surgery. No postoperative nausea developed in these patients.

■ *Conclusions*

Chlorpromazine was clinically tested with two selected groups to ascertain its possible value as an antinauseant and tranquilizing agent for the dental and oral surgery when general anesthesia was used.

Its tranquilizing effect observed in 67 children was sufficiently demonstrated to warrant its further investigation and use. While 10 mg. was the standard dose

Table
Observed emotional state (67 patients)

Initially	Relaxed 23 patients	Moderate 18 patients	Disturbed 26 patients	Total
During induction				
Relaxed	20	13	10	43
Moderate	3	4	13	20
Disturbed	0	1	3	4
During recovery				
Relaxed	19	14	11	44
Moderate	4	4	13	21
Disturbed	0	0	2	2

for the children 3 to 9 years of age, older and larger children have been found to tolerate 20 mg. without adverse reactions. Preliminary investigation with the drug appears to have explored only one of the approaches to the management of patients through tranquilization.

Chlorpromazine was administered to 29 patients as an antinauseant. Its rapid action was definitely superior to that of any previous agents used. No toxicities or side reactions were observed and the added effect of tranquilization to the previously nauseated patients was decidedly an aid to postoperative management.—*630 Tennessee Street.*

■ INFLUENCE OF PHYSICAL SCIENCE

No man will ever comprehend the real secret of the difference between the ancient world and our present time, unless he has learned to see the difference which the late development of physical science has made between the thought of this day and the thought of that (of ancient Greece), and he will never see that difference, unless he has some practical insight into some branches of physical science.—*Thomas Henry Huxley.*

Facial pain

■ *C. Dean Couch, Jr., D.D.S., Eglin Air Force Base, Fla.*

Among the most serious and baffling clinical problems that confront dentistry and medicine today are the understanding and the management of superficial and deep pain of the face. In spite of the efforts of a great many investigators directed toward all phases of pain and the results achieved, the intricacies of pain and its inner nature have not as yet been fully comprehended. It behooves the dentist to have a broad knowledge of the various causes of facial pain, as well as an understanding of nerve distribution in the face and the pathologic physiology of pain in this region. This knowledge is necessary so that he may either carry out appropriate treatment or refer the patient to a specialist in the indicated field.

In both scientific and lay literature there is a discrepancy in the use of the terms "neuritis" and "neuralgia." Neuritis is usually applied to diseases of the peripheral nerves; it denotes inflammation, even though in the majority of cases the changes are degenerative with some loss of function and are not inflammatory in nature. Neuralgia is a broad descriptive term used to denote painful sensations that extend along one or more of the cranial or spinal nerves. There is no distinct boundary between neuritis and neuralgia, and from a clinical viewpoint differentiation between the two conditions may be difficult although the loss of function in neuritis is frequently of diagnostic importance.[1]

■ *Anatomic Considerations*

The somatic and visceral components of the nervous system participate in supplying the organs of the head and neck. The somatic afferent and efferent nerves for the head and neck are contributed by the cranial nerves and upper cervical spinal nerves. These serve to receive stimuli from the skin, sense organs, muscles, tendons and joints and to set into motion the voluntary skeletal musculature. The visceral nerves for the involuntary muscles of the blood vessels and secretory reflexes of the glands in the head and neck are composed of two antagonistic systems—the parasympathetic and sympathetic systems. The parasympathetic fibers are contained in the oculomotor, facial, glossopharyngeal, and vagus nerves. The sympathetic fibers of the head have their origin in the upper three thoracic segments of the spinal cord and reach the neck and head in the sympathetic chain and its cranial continuation, the internal carotid nerve.[2]

The trigeminal nerve is the chief sensory nerve to the face. Its sensory fibers arise from unipolar cells in the gasserian ganglion. Briefly, the peripheral innervations are: (1) ophthalmic divisions—forehead, eyes, conjunctiva, nose, temples,

Captain, Dental Corps, USAF, 3201st USAF Hospital.

1. Bonica, John J. Management of pain. Philadelphia, Lea & Febiger, 1953, p. 73-88, 115-128, 134-137, 771-823.
2. Sicher, Harry. Oral anatomy. St. Louis, C. V. Mosby Co., 1949, p. 346-380.

paranasal sinuses and part of nasal mucosa; (2) maxillary division—maxilla, maxillary teeth and adjacent structures, upper lip, zygomatic and maxillary region of face, lower lid, maxillary sinuses, hard and soft palate and nasal mucosa; (3) mandibular division—mandible, mandibular teeth and adjacent structures, lower lip, buccal mucosa, tongue, part of external ear, auditory meatus and skin of the mandibular region. "Highly localizable pain is perceived in the cerebral cortex, whereas reactions to deep-seated pain take origin in the hypothalamus, the center for attitudinal and autonomic responses."[3]

The facial nerve is largely motor but its special sensory fibers carry taste sensations from the anterior two thirds of the tongue. The sensory fibers originate from the cells of the geniculate ganglion. The glossopharyngeal nerve is sensory to the pharynx, tonsils and posterior third of the tongue. The vagus nerve through its auricular branch supplies sensations to the ear and through its superior laryngeal branch supplies sensory fibers to the pharynx and larynx.

It is readily apparent that on anatomic grounds alone, the evaluation of facial pain is an extremely complex problem.

■ *Physiological and Psychological Considerations*

Most authorities agree that pain is a specific physiologic sensation produced by the stimulation of certain receptors and mediated through specific nerve structures and is not due to overstimulation of those receptors serving touch, thermal change or pressure.[4] The perception of pain is a relatively simple physiologic process like the perception of other sensations, and studies of the threshold of pain perception indicate that all healthy individuals have approximately the same capacity for perceiving pain. The reaction to pain varies considerably, however, since it is modified by the highest cognitive functions and depends in part on what the sensation means to the individual in the light of his past life experience. The latter depends in part on the mood, emotional status, the will, the state of the various cerebral functional processes, the presence or absence of anxiety and many other factors. Therefore, it can be said that the threshold for reaction to pain may vary widely in the same individual from day to day and under different circumstances. This is in contrast to the relative uniformity of the threshold of pain perception.[1,5]

Pain cannot be evaluated as a purely protective mechanism. Pain in its initial phases may be interpreted as such; in its late phase, however, when it becomes intractable, it no longer serves a useful purpose and through its mental and physical effects, becomes a destructive mechanism.[1]

The subject of referred pain[5,6] has caused greater controversy than any other phase of the general problem of pain. Referred pain, as the name implies, is felt adjacent to or at a distance from the site of its cause. "The distribution of referred pain and associated manifestations usually falls within the segmental distribution of

3. Lederle Laboratories Division, American Cyanamid Co. Facial pain. Lederle Newsletter, 1951, p. 1-13.

4. Harrigan, W. F. Facial pain. Oral Surg., Oral Med. & Oral Path. 5:563 June 1952.

5. Shapiro, H. H. Differential diagnosis of dental pain. Oral Surg., Oral Med. & Oral Path. 4:1353 Nov. 1951.

6. Papper, E. M., and Rovenstine, E. A. Pain syndromes of the face. Oral Surg., Oral Med. & Oral Path. 1:542 June 1948.

the nerves which supply afferent fibers to the site of the causative lesion."[1] The variety of possibilities of the origin of referred pain in the head and neck makes mandatory a careful search in all the structures of the face for a local lesion which may be responsible for the disability.

"Psychogenic pain is pain resulting from the projection of psychic conflicts to some organ without any abnormal activity or tension in the organ to which the pain is referred."[1] A patient's pain must never be classified as psychogenic until every possible organic cause has been eliminated. Failure to determine the causative factor of pain is insufficient reason for placing it on a psychogenic basis. Neurotic patients as a rule have a lower threshold for reaction to pain and, if this element of exaggeration can be eliminated by psychotherapy, it may be possible to uncover an organic basis for the original disturbance. If, however, a patient does have psychogenic pain, such pain demands careful evaluation and proper treatment equal to that given a patient with organic pain.

■ *Symptomatic Facial Pain*

PAIN ORIGINATING FROM ORAL CONDITIONS—Orban[5] states that "it is a peculiar feature that whatever stimulus reaches the pulp, it will always elicit only pain sensations." The most common cause of facial pain is pulpitis and its extension into the periodontal tissue with resultant pericementitis and possible subsequent abscess formation.[4] When pain in the face is considered to be odontogenic, thorough examination of the suspected tooth or teeth is imperative. Thermal change is the most important symptom that differentiates pain from teeth from facial pain or pain from other sources. In the early stages the source of pain may be localized by the use of x-ray, vitalometer, percussion, thermal sensitivity tests and local anesthesia. If localized intense pain is of long enough duration, it may become diffuse, and an entire division of the fifth nerve or all three divisions may become involved, thus making diagnosis more difficult.

Frequently a patient may describe pain from thermal change that seems to have no valid reason. Pain caused from a new filling, occlusal trauma, caries or deep fillings, are in this group. The pain starts spontaneously, there is absence of soreness on percussion, and vitality tests are positive. Pain starts with heat or cold or both. The pain in such a situation is probably due to hyperemia which may be arterial or venous. Wolfsohn[7] suggests treating the offending area of teeth with quartz light therapy. If the pain becomes localized, however, any questionable restoration should be removed and an anodyne cement inserted until the symptoms subside. Occlusal trauma, if existing, should be relieved in all instances. Pain which can be traced at variance with that of the fifth nerve (for example, pain radiating from the ala of the nose around the mouth to the chin or from one side of the face to another) usually indicates occlusal trauma.[8]

The edentulous patient with extensive alveolar atrophy may have a neuralgic

7. Wolfsohn, M. D. Diagnosis and treatment of oral neurologic pains. J.A.D.A. 30:680 May 1943.

8. Thomas, E. H. Differential diagnosis of pain in relation to oral surgery. J.A.D.A. 34:737 June 1, 1947.

type pain in the region of the mental nerve from trauma by the denture to the nerve as it passes through the mental foramen.

A continuous aching, throbbing pain occurring after the removal of a tooth is frequently due to localized alveolar osteitis. Such pain usually lasts from a few days to two or three weeks and is probably due to any one of a combination of factors such as trauma, diminished blood supply and infection. Control can be effected by the use of topical obtundents.

Impacted or unerupted teeth in adults which lie inclined toward their adjacent teeth may cause pain.[9] The pain is usually produced from pressure on an adjacent tooth or nerve. Impacted teeth frequently are overlooked as a cause of severe headache. Brock[10] reported a case of a 19 year old girl with nervousness, diplopia, and frontal headaches who had bilateral impacted maxillary third molars with supernumerary fourth molars. The removal of these teeth alleviated the girl's signs and symptoms. The mechanism of such relief is unknown and, of course, could be coincidental.

In the search for pain, roentgenograms should always be taken to preclude any possibility of pain from fractures, malignant growths, fibrocystic diseases, or cysts.

A burning tongue (glossodynia) which is not associated with demonstrable lesions or discernible systemic predisposing factors frequently has a psychogenic background.[11] Psychologists have pointed out that the mouth is directly related to the major human instincts and passions and that the tongue is one of the most common sites of psychoneurotic pain. An important diagnostic point in differentiating psychoneurotic tongue pain from lingual pain of organic origin is that the pain of psychoneurotic origin does not interfere with eating or sleeping. Frequently, the patient attributes his discomfort to some coexistent dental problem which may be a precipitating or aggravating factor or one that does not exist at all. Such conditions are the construction of dentures, irritation from clasps, fixed bridges, calculus deposits, sharp cusps or margins of cavities.

Ziskin and Moulton[12] list four causes of glossodynia: (1) deficiency states (pernicious anemia, nutritional deficiency, gonadal deficiency); (2) disturbances of gastric secretion (hyperacidity); (3) local causes (malposed teeth, rough restorations, allergy to cosmetics, oral sepsis), and (4) psychogenic causes (cancerophobia and mental strain). In their study of 14 middle-aged women with no observable lesions, it was concluded that the burning pain was primarily a psychogenic syndrome occurring mainly in women during menopause who are suffering from emotional conflict, sexual maladjustment and, frequently, cancerophobia. The patients treated did not get relief from estrogen therapy or placebo (injection of Ringer's solution). Young women who have had an artificial menopause also may be affected. A few men are affected, but it is never seen in children. Burning pain in the lips or

9. Penhale, K. W. Pain and its significance in oral surgery. J.A.D.A. 33:1399 Nov. 1946.

10. Brock, H. M. Effect of maxillary impacted third and fourth molars on the ciliary nerves of the eye. Am. J. Orthodont. & Oral Surg. 26:712 July 1940.

11. Burket, Lester W. Oral medicine, diagnosis and treatment, ed. 2. Philadelphia, J. B. Lippincott Co., 1952, p. 127-129, 153-155, 279-284, 297-304.

12. Ziskin, Daniel E., and Moulton, Ruth. Glossodynia: a study of idiopathic orolingual pain. J.A.D.A. 33:1422 Nov. 1946.

palate of edentulous patients may be due to the pressure of a denture. A diminished flow of saliva may also produce glossodynia or stomatodynia.

DISEASE OF THE TEMPOROMANDIBULAR JOINT — The temporomandibular joint, because of its complicated anatomic structure and physiology and the interdependence of its parts, is susceptible to acute and chronic traumatic arthritis. It has been determined by histologic, roentgenographic and clinical data that progressive dental occlusal abnormalities and muscular imbalance cause traumatic arthritis of the temporomandibular joint. Malocclusion of the teeth, asymmetrical loss of teeth or one-sided chewing habits, may influence and alter the anatomic arrangement of the temporomandibular joint and result in local symptoms.

Objective symptoms may include cracking or clicking, tenderness to palpation, deviation on opening and hypermobility or trismus (if in an acute phase). Subjectively, pain is felt most frequently in the condylar, auricular and temporal regions, the side of the neck and the back of the head. Bizarre ticlike sensations of the lips, cheek, gingiva, salivary glands and throat have been seen in a small number of instances.[13]

If a decrease in intermaxillary vertical dimension is suspected as a factor in the production of pain, Burket[11] suggests that a tongue depressor or folded corner of a towel be inserted in the molar region and that the patient should bite firmly. This frequently alleviates the pain and permits the assumption that occlusal rehabilitation should be instituted for relief of symptoms. Dechaume and co-workers[14] reported obtaining relief of pain through correction of defective occlusion even after retrogasserian neurotomy had failed to relieve the pain. Pain in the temporomandibular joint is most probably due to slight but continuous irritation of the articular branches of the auriculo-temporal nerve and periarterial sympathetic nervous system in proximity to the articulation and not to compression of the auriculo-temporal nerve itself as originally thought.

The cause of temporomandibular joint pain may also date back to a particular episode which resulted in injury, for example, exaggerated yawn, traumatic extraction or prolonged opening during restorative procedures. Differential diagnosis of pain in the face from that in the joint can be made by injecting the joint with an anesthetic solution.

Treatment depends largely on the cause and the amount of inflammation within the joint. If the condition is acute, it should be treated conservatively by intermaxillary immobilization, application of infra-red heat over the joint area, and salicylates, with subsequent occlusal equilibration and opening of the bite with splints if necessary. Henny[15] reported obtaining relief of pain by injection of hydrocortisone in the initial acute stages. Chronic traumatic arthritis may be treated by restricting the diet to soft foods, liquids and salicylates. The patient may be instructed to use heat over the joint until the pain is relieved. Occlusal

13. Brussell, I. J. Temporomandibular joint diseases: differential diagnosis and treatment. J.A.D.A. 39:532 Nov. 1949.

14. Dechaume, M.; Poggioli, J. A., and Rouot, J. Part played by the sympathetic nervous system in the pathogenesis of disorders resulting from dental malocclusion. Oral Surg., Oral Med. & Oral Path. 6:1047 Sept. 1953.

15. Henny, Fred A. Intra-articular injection of hydrocortisone into the temporomandibular joint. J. Oral Surg. 12:314 Oct. 1954.

and vertical adjustments should be initiated as soon as possible. If hypermobility with clicking or cracking in the joint is associated with pain, Schultz[16] recommends injection of a sclerosing solution such as Intracaine and oil but never when the joint is acutely inflamed. Jaw movements are restricted for 24 to 48 hours to allow for the production of scar tissue and thus limitation of opening of mandible. Injection of joints should always be done bilaterally.

SINUS PAIN[9, 17, 18]—Sinusitis has been rated by some as the second most common cause of facial pain. The pain is deep, persistent, dull, aching and nonpulsating. The history of a previous head cold is important, since sinusitis usually follows a cold which has been slow in resolving. Pain is lessened when the patient is in the recumbent position.

The sinuses may be divided into two groups for consideration. The posterior group (sphenoidal and posterior ethmoidal) give rise to pain behind and between the eyes and over the parietal region which radiates to the vertex of the skull. The anterior group is composed of anterior, ethmoidal, frontal and maxillary sinuses. The first two may produce pain over the forehead and tenderness over the frontal sinus with a feeling of fullness associated with dull headache between the eyes. Maxillary sinusitis, the most common, is characterized by pain and tenderness over the cheek, aching teeth which are tender to percussion and a feeling of fullness or pressure on the affected side. Diagnosis can be confirmed with a roentgenogram of the maxillary sinuses taken in the Waters' position.

PAIN AS A MANIFESTATION OF CEREBRAL DISEASE[19]—Pain may be caused by tumors, aneurysms, multiple sclerosis, or syringobulbia.

Any lesion of the posterior root, gasserian ganglia or peripheral branch of the fifth nerve may give rise to facial pain. Disease peripheral to the posterior root usually causes a constant pain which may be referred to one or all of the divisions of the fifth nerve. Lesions along the root and pons are apt to induce paroxysmal pain similar to tic douloureux. Tumors of the gasserian ganglion very early give rise to severe pain and numbness in the face. Rarely, one of the first manifestations of a neoplasm in the cerebellopontile angle will be typical paroxysmal trigeminal pain.

Such symptomatic trigeminal neuritis usually may be clearly differentiated from trigeminal neuralgia by the presence of neurological changes and in particular by sensory disturbances in the distribution of the fifth nerve. Such alterations in the nervous function in a patient suffering from trigeminal neuralgia should lead to a careful neurologic examination for an intracranial lesion before treatment is instituted.

Intracranial aneurysms may be responsible for facial pain. These vascular anomalies usually involve the trigeminal root between the gasserian ganglion and pons at the gasserian ganglion or more commonly the ophthalmic division as it

16. Schultz, Louis W. Report of ten years' experience in treating hypermobility of the temporomandibular joints. J. Oral Surg. 5:202 July 1947.

17. Afonsky, D. Trigeminal nerve. Applied neurology and symptomology of face pain and lesions involving the trigeminal nerve. Oral Surg., Oral Med. & Oral Path. 5:913 Sept. 1952.

18. Shanasy, Frank. Headache and facial pain. Oral Surg., Oral Med. & Oral Path. 2:752 June 1949.

19. Walker, A. E. Relief of facial pain. M. Clin. North America 29:73 Jan. 1945.

passes through the cavernous sinus. A history of the neurological findings is usually sufficient to make the diagnosis.

Paroxysmal facial pain is encountered in multiple sclerosis more frequently than the chance coincidence of tic douloureux. A plaque in the spinal root of the fifth nerve is present in some of these instances and is thought to be responsible for the pain.

Syringobulbia may also have as a symptom attacks of facial pain presumably due to involvement of the fifth nerve centers.

PAIN AS A MANIFESTATION OF SYSTEMIC DISEASE—Most pain manifested on both sides of the face, aside from that caused by occlusal trauma, is caused by systemic disease.[8]

Syphilis may attack the sensory roots of cranial nerves producing dull pain with superimposed shooting pain, that often increases at night.[18] Involvement of the fifth nerve may produce paroxysmal pains similar to those of major trigeminal neuralgia. Trigger zones are missing, however, and signs of other nervous system involvement differentiate pain of syphilis from trigeminal neuralgia.

A deficiency of thyroid hormone in the adult may give rise to a syndrome of chronic, recurring pain about the face and neck and recurring headaches. The pain may be dull, aching or throbbing. Quite frequently there may be associated dull pain or a sense of constriction over the precordium. If the patient also complains of insomnia and fatigue and is inclined to be sensitive to cold, a hypothyroid state should be suspected. Watts[20] reported on 29 such patients in whom there was loss of symptoms in about two weeks with thyroid extract treatment.

Allergy, a little-understood constitutional disease, may cause pain about the face and head as well as elsewhere. Various allergens may produce neuralgic head and face pain in susceptible individuals, probably because of the release of histamine. The diagnosis rests on the demonstration of the offending substance through skin tests, therapeutic tests, or through elimination methods. This type of pain seldom can be eliminated, but the frequency and duration of attacks may be greatly decreased.

Herpes zoster of the gasserian ganglion[11] is not infrequent and may involve any one of the three branches of the fifth nerve. Severe pain and redness may be present in one or all divisions, followed in two to three days by a vesicular eruption on the face. About the time these lesions dry—usually leaving a brownish scale—the pain recedes. For several weeks the involved region may be hyperesthetic to touch. Paroxysmal or persistent pain may continue for months.

Herpes zoster may also involve the geniculate ganglion[1] of the seventh nerve. This condition was first described by Ramsay Hunt in 1907 and is characterized by pain in and behind the ear and deep in the face, particularly in the palatal, nasal and zygomatic regions. Herpetic vesicular eruptions occur in and around the external auditory meatus, the pillars of the fauces and the anterior two thirds of the tongue on the same side. There may also be peripheral facial paralysis, loss of taste in

20. Watts, F. B. Atypical neuralgia in hypothyroid state. Ann. Int. Med. 35:186 July 1951.

anterior two thirds of the tongue with pain radiating into the neck and shoulder. There is a noticeable similarity in pain in the Ramsay Hunt syndrome and atypical neuralgia. Roentgen ray therapy sometimes gives relief. Protamide,[21] a proteolytic enzyme preparation, as well as intravenous procaine, has been reported by some as giving relief.

Pellagra, scurvy, acute leukemia, aleukemic leukemia, aplastic anemia, granulocytopenia and infectious mononucleosis[19] may cause pain, particularly when these conditions are complicated by Vincent's infection. Tuberculous ulcers, although rare, are extremely painful.

OTALGIA[4, 22]—The pain of acute ear disease may at the onset be referred to distant regions. For its size the ear has the largest nerve supply of any organ in the body. It is supplied by the fifth, seventh, ninth, and tenth cranial nerves. Many regions, therefore, remote from the ear can elicit pain and vice versa. The commonest cause of ear pain is otitis media. The pain is throbbing and there is difficulty in hearing and a feeling of heaviness and fullness in the ear. Pain in the ear may be associated with tonsillitis, nasopharyngitis, temporomandibular joint syndrome, disorders of the cervical spine, or typical and atypical neuralgia.

ELONGATED STYLOID PROCESS[3, 5, 23]—Of the 4 per cent of persons who have a styloid process longer than 2.5 cm., only a few have symptoms. In most patients, symptoms after a tonsillectomy occur in the form of a constant nagging dull ache in the pharynx with pain referred to the ear, which suggests poor healing of the tonsillectomy wound. Some patients may have symptoms from a styloid process of normal length, but with a deviated tip which impinges on the external or internal carotid artery, irritating the sympathetic nerves in the arterial sheath and producing pain along the distribution of the ophthalmic artery. This pain is confined to eye level or above; when the external carotid artery is involved, pain is referred to below eye level. The elongated process can be palpated and the pain reproduced by a finger in the tonsillar fossa, and the presence of an abnormal process can be confirmed by roentgenographic examination. Surgical removal of the tip of the styloid process is the only method of relieving the symptoms, whether by intraoral or extraoral approach. Douglas and Huebsch[24] reported an instance in which the patient had experienced sharp, shooting pain for four years, with only five or six intervals in which there was no pain. The pain was over the left side of the face and neck. Roentgenographic examination revealed a fracture of the styloid process. The teeth were wired for three weeks with relief of pain on the second day. There was no recurrence of the pain.

■ *Idiopathic Facial Pain*

TRIGEMINAL NEURALGIA—Trigeminal neuralgia[17, 22, 25] is usually seen in middle-

21. Combs, Frank C., and Canizares, Orlando. Herpes zoster: its treatment with protamide. New York J. Med. 52:706 March 15, 1952.

22. Glaser, M. A. Facial neuralgia, its etiology and treatment. J.A.D.A. 26:1483 Sept. 1939.

23. Weisengreen, H. H., and Winters, S. E. Pathways of referred pain with a special reference to head and neck. A neuroanatomic study. Oral Surg., Oral Med. & Oral Path. 5:500 May 1952.

24. Douglas, Bruce L., and Huebsch, R. F. Atypical facial neuralgia resulting from fractured styloid process of the temporal bone. Oral Surg., Oral Med. & Oral Path. 6:1199 Oct. 1953.

25. Dandy, W. E. Concerning cause of trigeminal neuralgia. Am. J. Surg. 24:447 May 1934.

aged patients, occurring unilaterally, most frequently on the right side. One or more divisions of the trigeminal nerve may be involved; however, the second division is more commonly affected, followed by the third and first divisions.

The pain is sudden in onset, excruciating and stabbing in character, lasts only a few seconds, and is followed by a low-grade aching pain. The duration of these paroxysmal attacks usually is short in the early stages, but may grow longer in the later stages. The interval between attacks may vary from a few hours to days, months, or years in the beginning; as the disease progresses, however, the intervals shorten.

A trigger zone may exist on the side of the tongue, at the angle of the mouth, on the upper lip, supraorbital notch or elsewhere, and slight irritation of one of these zones by such a simple act as shaving, brushing the teeth, swallowing, talking or laughing may produce attacks.

The most satisfactory methods of treatment to date include alcohol block of the involved peripheral branch or division, peripheral neurotomy, retrogasserian neurotomy and decompression of the trigeminal root and the posterior part of the ganglion as described by Taarnhøj.[26]

Temporary analgesia by alcohol block[19,27] has certain advantages. In debilitated patients the injection may effect enough relief to permit a normal intake of food until the patient's general health and nutrition are improved and the operative risk is reduced. The duration of numbness after an alcohol injection also gives the patient ample opportunity to decide whether he prefers numbness to his original pain.

Peripheral neurotomy is indicated only when the neuralgia is of an incipient or peripheral form and involves only one branch of the nerve. The procedure is simple and safe and can be repeated when the neuralgia occurs. The usual period of relief ranges from 6 months to 2 years. Peripheral neurotomy should be done radically and as thoroughly as possible with the excision of at least 3 cm. of nerve.

For the past 50 years, retrogasserian neurotomy[19] has offered the safest and most certain method of surgical treatment of trigeminal neuralgia. The operation can be done under either local or general anesthesia, and is relatively simple with a mortality of less than 1 per cent. Selective sectioning of the maxillary or mandibular fibers can be done to preserve the ophthalmic division for corneal reflex and the motor root to the muscles of mastication. The main disadvantage of this procedure is the resulting anesthesia of the face and other involved tissues. After complete sectioning of the sensory root, keratitis results in approximately 16.7 per cent of the patients, and in approximately 10 per cent of these, enucleation of the eye is necessary to control infection.

Taarnhøj,[26] in 1952, announced that he had alleviated the pain of trigeminal neuralgia in ten patients by decompression of the posterior root of the fifth nerve without loss of sensory function. The mechanism by which pain is relieved in this operation has not been explained, but it has been suggested that compression of the nerve root or disturbance of the circu-

26. Taarnhøj, P. Decompression of trigeminal root and posterior part of ganglion as treatment in trigeminal neuralgia; preliminary communication. J. Neurosurg. 9:288 May 1952.

27. Sweet, W. H. Trigeminal injection with radiographic control; technic and results. J.A.M.A. 142:392 Feb. 11, 1950.

lation of blood or spinal fluid at the ganglion might be an etiologic factor. The Taarnhøj operation consists of approaching the ganglion intradurally and opening wide the sheath of the ganglion. This procedure with some modifications has been widely used in this country in the past year by many neurosurgeons. Cleveland[28] reports that he used it with 24 patients and in only two was there return of pain postoperatively. Gass and McGuire[29] have made use of it in 12 instances. In two of these, mild pain returned which did not require any specific treatment. The results of this operation cannot be evaluated fully as an effective and lasting cure for trigeminal neuralgia, but its continued use is warranted in view of present success.

GLOSSOPHARYNGEAL NEURALGIA — The pain of glossopharyngeal neuralgia[6, 18, 22] occurs as severe paroxysms similar to trigeminal neuralgia. It occurs unilaterally in the region of the base of the tongue, soft palate, tonsillar fossa and internal ear. During the attack there is a sense of dryness in the throat, which is followed by a cough as if the patient were attempting to expel an irritating substance from the throat. Diagnosis of glossopharyngeal neuralgia can be verified by cocainization of the throat which alleviates the trigger zone and prevents paroxysms. Sectioning of the ninth nerve is the treatment of choice. Alcohol cannot be used safely or efficiently as a block.

SPHENOPALATINE NEURALGIA[1, 11] (SLUDER'S SYNDROME)—There is some doubt as to whether sphenopalatine neuralgia is a definite clinical entity.[18] Sluder first described this syndrome in 1910 as a "complex symptom partly neuralgic, motor, sensory and gustatory."[30] The region of the orbit and base of the nose are the sites of maximal pain, with radiation over the homolateral side of the face, neck, occiput and even the upper limb. There may also be a feeling of fullness in the ear with associated tinnitus and vertigo. The pain is usually deep, boring or burning, but in certain instances may stop and may reappear with stabbing sharpness as a tic.

Shanasy[18] states that irritation of the branches of the maxillary division of the fifth nerve, which lie closely associated with the sphenopalatine ganglion in its fossa lateral to the nasal cavity and behind the maxilla, may produce pain similar to sphenopalatine neuralgia. Such irritation may be produced by narrow nasal passages, enlarged turbinates, septal deviation or spurs, neoplasms and congestion produced by vasomotor, emotional, allergic, and atmospheric changes. Wolff[31] states that the entire syndrome is due to vasodilation of the third portion of the internal maxillary artery that supplies the region about the sphenopalatine ganglion.

Cocainization of the nasal mucosa just posterior to the middle turbinate will relieve the pain and verify the diagnosis. Poe[32] has described a transantral approach for excision of the sphenopalatine gang-

28. Cleveland, David. Treatment of trigeminal neuralgia by a new decompression operation. J.A.D.A. 49:289 Sept. 1954.

29. Gass, Harvey E., and McGuire, J. E. Personal communication, Oct. 1954.

30. Stuteville, O. H., and Levignac, J. Neuralgias and vascular algias of the face. Oral Surg., Oral Med. & Oral Path. 6:1413 Dec. 1953.

31. Wolff, H. G. Headache and other head pain. London, Oxford University Press, 1948, p. 414-426.

32. Poe, D. L. Transantral approach for excision of sphenopalatine ganglion for intractable facial pain. Arch. Otolaryng. 51:891 June 1950.

lion when there is intractable pain from this source.

BUCCAL NEURALGIA[18, 33]—Buccal neuralgia was first described by Reichert in 1940. He described the pain as a burning, boring, aching, throbbing type, occurring in the region of the lips, cheeks, gingiva, tongue, nose and upper and lower jaws. The pain may be present from a few minutes to several days. No true trigger areas exist, but pain may be precipitated by chewing, talking or temperature changes. Relief of pain has been obtained in some instances by stripping the external carotid artery of nerve fibers running beside it or by removing a segment of the facial artery at the inferior border of the jaw.

ATYPICAL NEURALGIA[22, 30, 34]—It has long been noted that some patients with facial and head pain do not present the typical picture of cranial nerve neuralgia. The term "atypical neuralgia" is used to describe this pain, which is a continuous, peculiar, deep-seated, aching pain from which the patient is never free. Superimposed on this chronic steady pain are attacks of greater or lesser severity occurring at varying intervals and lasting from a few hours to days. Sympathetic phenomena (ocular disturbance, nausea, flushing of the face, nasal discharge, perspiration, salivation, puffiness of face, feeling of warmth, tinnitus and chills) are associated with the pain in about 50 per cent of the patients. The pain is bilateral in 33 per cent of the patients and does not follow the distribution of any of the cranial nerves. Rather, the region affected is that supplied by the external carotid artery and particularly the internal maxillary artery and its branches. The occipital region and neck, as well as the face, are involved.

The cause of atypical neuralgia is not known definitely. It is the general consensus that the underlying pain mechanism is the result of a neurovascular disorder and is related to migraine.

Wolff[31] concluded that, regardless of the origin of the pain, the cause of the pain was dilation of one or more branches of the external carotid artery. Pain may also be produced from sustained contraction of skeletal muscles secondary to vascular distention. It has been stated[1] that,

> The pain impulses arising from such vessels are said to be conveyed by afferent fibers which pass via sympathetic pathways, the cervicothoracic chain, and thence into the spinal cord. In addition, indirect evidence suggests that some of these painful impulses from the blood vessels of the face pass centrally by way of the facial, the vagus, and possibly the glossopharyngeal nerves.

The diagnosis of atypical neuralgia is usually difficult and often must be made by exclusion of all other possible irritating factors in the production of the pain in the face.

Relief of pain has been obtained with some degree of success by histamine desensitization. Wolff,[31] in his study series, alleviated or eliminated the pain in most of his patients by injection of 0.5 mg. of ergotamine tartrate. Psychotherapy is of particular value because in many instances emotional stress, tension and anxiety precipitate or aggravate an attack. The use of analgesics combined with a sedative is of

33. Adson, A. W. Neuralgia of face; diagnosis and treatment. J. Internat. Coll. Surgeons 11:1 Jan.-Feb. 1948.

34. McElin, T. W., and Horton, B. T. Atypical face pain; statistical consideration of 66 cases. Ann. Int. Med. 27:749 Nov. 1947.

value. Interruption of the pain pathways should be attempted if relief of pain cannot be obtained by other methods. This should be done by trial analgesic blocks of the cervicothoracic sympathetic ganglia with a local anesthetic before prolonged interruption by use of alcohol or by surgery is done.

FACIAL NEURALGIA (PRIMARY GENICULATE NEURALGIA)[1]—Geniculate neuralgia is extremely rare and is characterized by paroxysmal, lancinating pain in the ear. The nervus intermedius, the sensory portion of the seventh nerve, is the portion involved. The etiology is supposedly the same as in trigeminal neuralgia. Sectioning of the nervus intermedius will give relief of pain. Because of the overlap between the nervus intermedius and the glossopharyngeal nerve, a definite diagnosis between geniculate neuralgia and glossopharyngeal neuralgia cannot be made except at operation under local anesthesia.

VAGUS NEURALGIA[1]—Major neuralgia of the vagus nerve rarely occurs, but when it does, it often resembles glossopharyngeal neuralgia. The auricular branch which supplies sensory fibers to the external ear and the superior laryngeal branch which supplies the larynx, epiglottis and base of the tongue are the branches involved. The pains are severe, unilateral, lancinating paroxysms which radiate from the thyroid cartilage to the angle of the jaw and to the ear. The pains are precipitated by talking, swallowing and yawning. Vagus neuralgia can be differentiated from glossopharyngeal neuralgia by blocking the superior laryngeal nerve. Because of the simplicity of injection, alcohol block is the treatment of choice. Sectioning of the recurrent laryngeal nerve is done in instances in which the pain has returned after one or more alcohol blocks.

■ *Conclusion*

Facial pain presents a challenge to the dentist and the physician which must be met, for it is one of man's most vexing perennial problems. A thorough examination and differential diagnosis should be made prior to making the final decisions regarding treatment. Even though objective lesions which may be responsible for the patient's pain cannot be determined at once, an attempt should be made to relieve the patient's subjective symptoms since it is in the latter that the patient is primarily interested. As Goldscheider[23] suggests,

> To wipe out pain entirely is an impossibility and we cannot and would not do without it, since pain is necessary not only as a monitor in the combat against hostile powers but also an inspirer to ethical emotions. For it is chiefly in the reminiscence of one's own pain, both physical and mental, that love and active charity are rooted.

■ WORDS

Nowadays a word is a deed whose consequences cannot be measured.—*Heinrich Heine.*

Hemangioma of the buccal pad with phlebolithiasis

■ *William J. Deighan, Jr.,* D.M.D., Bangor, Maine, and E. J. Barton,† D.M.D., Newcastle, N.S.W., Australia*

Phleboliths usually occur in either of two sites. They may be found in otherwise normal venous channels as the result of organization and subsequent calcification of a thrombus, or they form in a similar manner from thrombi occurring in hemangiomas.

Hemangiomas arise, hamartoma-like, from vascular channels. They may range in type from a simple proliferation of existing vessels, the capillary type, to those of a cavernous nature. When the hemangioma occurs in close relation to a skin surface, it presents certain gross features which aid in the diagnosis. When the mass is deeply situated, it may be more difficult to make a diagnosis. It is this latter type with which this paper is primarily concerned.

The presence of capillary and cavernous hemangiomas in combination may indicate varying stages in development of the same condition. The etiology of hemangiomas is uncertain. The commonly accepted theory at the present time is that they begin as congenital anomalies from fetal tissue inclusions and are noted later when obstruction of vessels dams blood flow and leads to formation of blood-filled spaces.[1,2]

Trauma may be a factor in growth. Variations in size make it conceivable that many small lesions are never observed until disturbed by trauma which can occur at any age. Baumgartner[3] reported on a patient in whom the mass was present from youth but did not grow rapidly until 60 years later. The nature of the trauma is open to speculation. Movement of a muscle during its active phase may constitute an irritating factor. Infection, extremes of temperature and minimal constant trauma such as engagement by teeth in poor occlusion may be irritants of sufficient intensity to initiate the condition.

The distribution of hemangiomas does not appear to be linked with color, age or sex. All periods of duration from congenital occurrence to 30 years standing are reported. Phleboliths have been reported in about 10 per cent of recorded cases.[4]

■ *Symptoms*

The precipitating symptoms which lead patients to seek treatment generally are pain or swelling. The pain may be

*Formerly, resident, department of oral surgery, University of Alabama, School of Dentistry, and the Jefferson Hillman Hospital, Birmingham, Ala.

†Formerly, fellow in dentistry, University of Alabama, School of Dentistry.

1. Thoma, K. H. Pathology, ed. 2. St. Louis, C. V. Mosby Co., 1941.

2. Anderson, W. A. D. Pathology, ed. 2. St Louis, C. V. Mosby Co., 1953.

3. Baumgartner, H. Cavernous hemangioma of tongue. Schweiz. med. Wchnschr. 55:1030 Nov. 5, 1925.

4. Davis, J. S., and Kitlowski, E. A. Primary intramuscular hemangioma of striated muscle. Arch. Surg. 20:39 Jan. 1930.

due to pressure on adjacent nerves or on nerve fibers which become enclosed within the mass. The pain, usually dull and throbbing, appears to be deep-seated rather than superficial in nature. Mechanical functioning of the part or postural change also may cause pain. There may be no pain when the part is at rest. Phleboliths themselves do not necessarily cause pain unless tissues are compressed against them. After this, functional impairment of the part may occur.

■ *Diagnosis*

Diagnosis may be difficult because the symptoms may vary with the size and the site of the mass. The skin overlying the mass may be normal and freely movable. Palpation may occasionally elicit a pulsation, but this occurs at no definite stage and could be transmitted from a nearby artery. Consistency may range from soft, the more common type, to extremely hard. Instances are reported of one mass with an ossified center and others in which phleboliths could be palpated.[5,6] Muscle contraction also can cause a change in consistency to palpation. Usually pressure over a deep hemangioma will cause it to be reduced in size through the emptying of the blood contained within it; it will then return to its original size in a short time.

Roentgenographic evidence of the presence of phleboliths provides a definite diagnostic sign. Close examination of these masses is necessary, since only circular or oval radiopacities varying in size from 1 to 6 mm. are common. When they lie close to bone they must be differentiated from osseous structures. This differentiation is based on the trabecular pattern found in the osseous structures as compared with the "onion-peel" arrangement of concentric layers seen in the true phlebolith. When located about the face and jaws, they must be differentiated from calculi originating in the ducts and glands of the salivary system. Sialography will usually rule out salivary gland involvement.

■ *Differential Diagnosis*

The following facts must be remembered when making a differential diagnosis:

A lipoma is of a soft lobulated nature and does not decrease in size with compression.

A fibroma has well-defined borders and is of firm consistency.

A sarcoma is rare, but should be considered as it may arise from any of the connective tissues.

A dermoid cyst may be found about the head and neck only. It is a circumscribed pultaceous mass which does not empty with compression.

Myositis ossificans will present a characteristic roentgenographic appearance.

A hematoma will contain venous blood if aspirated early and serum if aspirated later, but does not contain arterial blood.

Muscle hernia will change size with contraction or relaxation of the muscle, and a hiatus may be felt in the overlying fascia.

5. Wakeley, C. P. G. Calcification in angiomata. Arch. Radiol. & Electroth. 25:363 May 1921.

6. Thoma, K. H., and others. IV. Contribution to the oncology of the jaws. Oral Surg., Oral Med, & Oral Path, 1:54 Jan. 1948.

■ *Pathology*

Although classified as benign, angiomas increase in size by infiltration, a characteristic of malignant tumors. They may spread to adjacent tissues, not through expansion, but by infiltration of the tissue by endothelial buds which later give rise to capillaries. The region surrounded by these capillaries is destroyed giving rise to a fenestrated appearance of the part. Cases have been reported in which an angioma has undergone malignant degeneration,[2] but suppuration after interference is more common.

In microscopic sections, dense connective tissue gives the appearance of a fibrous tumor; if loose connective tissue is present, spaces are more prominent.

The septums vary in thickness according to the fibrous tissue content. In places the septums may be so thin as to have the lining endothelium of adjacent spaces lying back to back. The septums may not be complete and may appear to act as valves.

The arterial walls may show thickening to the extent of occasionally blocking the vessel. Incorporated nerve fibers appear normal in structure. Muscle, where implicated, may show various characteristics depending on its location. In some regions it retains a normal staining reaction. Elsewhere there may appear bands of uniform color, with no stain differentiation to indicate variation in structural morphology.

■ *Treatment*

Patent vascular channels may be obliterated by injection of sclerosing agents which results in reduction of the size and activity of the tumor. Cautery and treatment by electrolysis also have been used, but excision consistently gives the best results. In well demarcated masses, enucleation is in order. When the tumor is diffuse, it is necessary to remove the mass with an adequate margin of surrounding tissue to insure against recurrence. In suitable locations, ligation of incoming vessels leads to an emptying of the neoplasm and subsequent atrophy of the connective tissue elements. Ligation is seldom used about the face because of lack of access. Treatment by radon implants has proved satisfactory in carefully selected cases.

Two factors must be considered in deciding on treatment of hemangiomas in infants. First, spontaneous recession of the capillary type is common as the patient grows older. Hence a policy of observation of the capillary type is advisable. Hemangiomas of the cavernous type, however, tend to increase considerably in size along with normal growth of the patient, making the problem of correction increasingly difficult.

■ *Prognosis*

The prognosis in hemangiomas is excellent. Hemangiomas are benign; whether they become malignant has never been established definitely.

■ *Report of Case*

On March 26, 1954, a 31 year old negro woman was first seen in the University of Alabama School of Dentistry, department of oral surgery, with the chief complaint of an intermittent throbbing pain associated with enlargement of the right cheek. Both swelling and throbbing were aggravated by chewing.

Fig. 1—Preoperative view showing minimal enlargement of right cheek

PAST HISTORY—The swelling had been noticed first 15 years previously. It had gradually increased in size. In 1941, the patient had a calcified mass, about 4 mm. in diameter, plus a small amount of adjacent tissue, removed intraorally from the right cheek. The pathologist's report of the specimen had been "fibro-fatty tissue," but apparently a postoperative diagnosis of parotid calculus was made at that time.

After the operation, the swelling of the right cheek was slightly reduced in size, but the cheek never returned to normal. The throbbing ache in the patient's cheek disappeared but had returned four years after the operation and had become steadily worse. The lesion also had gradually enlarged. More recently she had noted tenderness in the region of the right parotid gland when eating sour or spicy foods. The family history and the patient's past medical history were noncontributory to her present illness.

CLINICAL EXAMINATION—Extraorally, there was a slight, apparently noninflammatory, soft swelling of the right cheek (Fig. 1). The parotid gland was not enlarged but was slightly tender to palpation. Intraorally, the opening of the Stensen's duct on the right side was seen about 2 cm. anterior to its normal position. It was patent and could be probed for about 4 cm. There was normal salivary flow. Bimanual palpation of the right cheek revealed a large mass with multiple individual nodules. Palpation was accompanied by moderate tenderness.

ROENTGENOGRAPHIC OBSERVATIONS—Roentgenograms of the cheek revealed multiple, small, concentrically calcified bodies varying in size from 1 mm. to 5 mm. in diameter lying immediately anterior to the ascending ramus (Fig. 2). A similar film taken of the left side was normal. A sialogram of the right parotid gland was made using iodopyracet 35 per cent aqueous solution, followed by iodized oil, U.S.P. (Fig. 3). The sialogram demonstrated normal gland structure and showed no evidence of obstruction within the duct; however, Stensen's duct was displaced slightly superiorly from its normal position as it passed over this mass in the cheek.

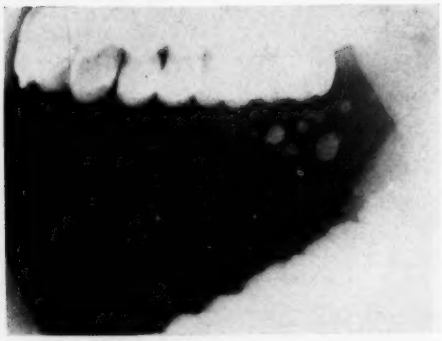


Fig. 2—Concentrically calcified bodies in right cheek

On the basis of the patient's history, the clinical examination and roentgenographic study, a tentative diagnosis of hemangioma with phlebolithiasis was made. Other roentgenograms were made to look for possible phlebolithiasis in other parts of the body with no significant findings. Routine blood studies and urinalysis were within normal limits.

TREATMENT—The patient was first seen on an outpatient basis. One day before the operation, 400,000 units of procaine penicillin was administered intramuscularly. On April 10, the patient was premedicated with 50 mg. of meperidine one hour preoperatively, and under infiltration anesthesia (lidocaine hydrochloride with 2 per cent epinephrine 1:100,000), the following procedures were carried out.

The patient was prepared and draped and a rubber bite-block was placed between the posterior teeth on the left side. A horizontal incision was made beginning at the anterior border of the ramus of the mandible on the right side and carried forward slightly below the Stensen's duct for 5 cm. Two vertical incisions approximately 2 cm. long were made at each end of the initial incision, which exposed the buccinator muscle. These incisions were carried through the buccinator muscles to expose the buccal pad of fat. Bleeding was minimal.

Small hard calcifications could be palpated within the buccal pad, and the fatty tissue was interspersed with reddish-blue masses of hemangiomatous tissue. The greater part of the buccal fat pad

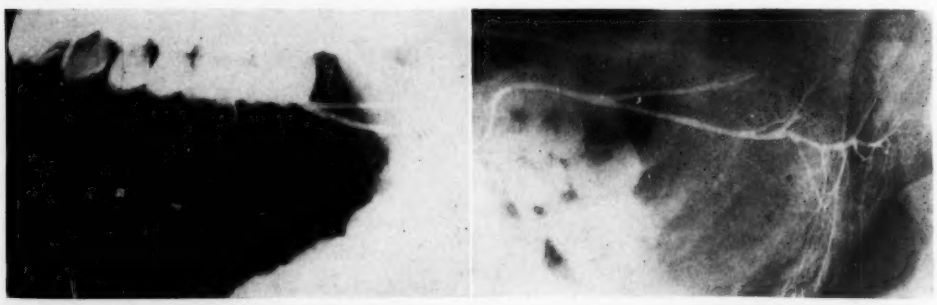


Fig. 3—Left: Sialogram demonstrating relation of right Stensen's duct to calcifications. Right: Sialogram of parotid gland on right side showing normal glandular filling with no evidence of obstruction by calcifications

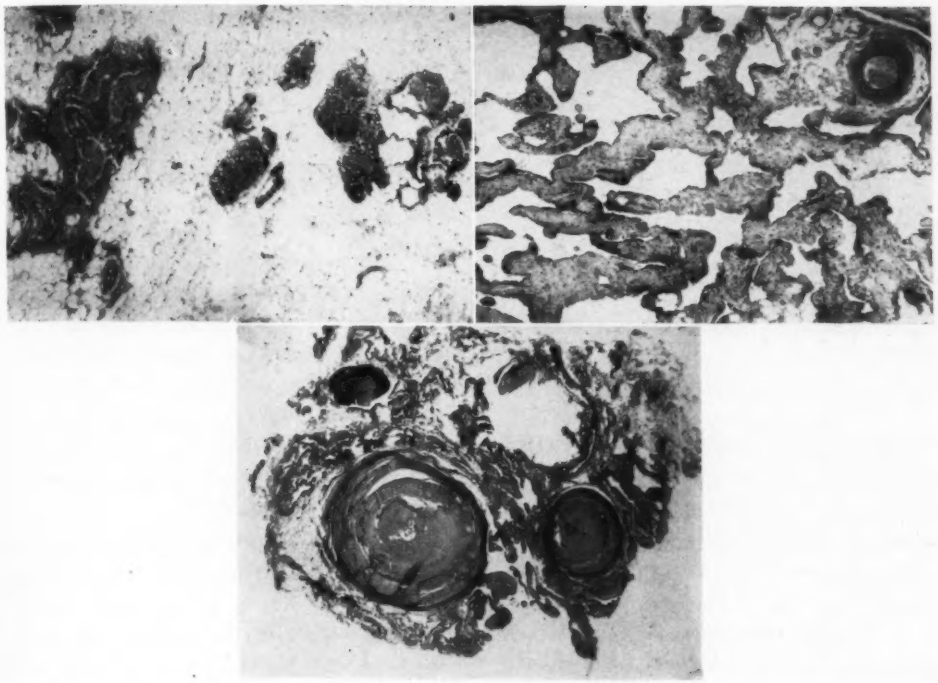


Fig. 4—Above left: Vascular channels in relation to fatty tissue. Above right: Cavernous hemangioma in tissue of buccal fat pad. Below: Phleboliths can be demonstrated along with an organizing thrombus in hemangiomatous tissue

was carefully dissected out. The hemangiomatous tissue extended with the fat pad into the pterygomandibular fossa; this was also dissected free. The long buccal nerve was unavoidably sacrificed in the process. The fat pad was further dissected up the coronoid process, and several small blood vessels were tied off laterally and medially. The complete mass was then removed *in toto*. A Penrose drain was inserted, and the buccal mucosa was closed with no. 000 black silk interrupted sutures.

Although there was considerable edema, the patient's postoperative course was otherwise uneventful. She was discharged on the fifth postoperative day.

PATHOLOGY REPORT—The pathologist reported that the sections showed many vascular channels in fatty tissue (Fig. 4, above left). Some of the vessels were surrounded by fibrous tissue while others were directly in contact with fat. In most instances, the structure of the vessels in the aggregate resembled a cavernous hemangioma (Fig. 4, above right). Thrombi of various ages were present in some of the vessels. Some were in a very early stage, others showed various degrees

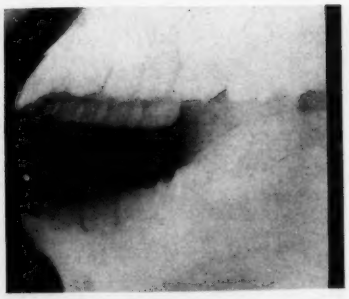


Fig. 5—Postoperative view taken two months after surgery

of organization. Several of the vascular channels were occupied by round, laminated, calcified bodies having the general structure of phleboliths (Fig. 4, below). There was no evidence of present inflammatory activity nor fat necrosis.

The diagnosis was cavernous hemangioma of the buccal fat pad with phlebolithiasis.

POSTOPERATIVE FOLLOW-UP—For the first month, the patient was seen weekly in the oral surgery clinic. When seen on May 8, 1954, all swelling and other symptoms had subsided. There was some scarring of the buccal mucosa which limited the opening of the mouth initially, but after exercises the patient eventually was able to open it normally.

Roentgenograms taken on May 31, approximately two months postoperatively, showed no evidence of any phleboliths (Fig. 5). The patient was followed through July 1954, and has been seen every six months for periodic checks with no evidence of recurrence.

■ *Summary*

Hemangiomas, although classified as benign, increase in size by infiltration and may spread to adjacent tissues. Cases have been reported in the literature in which an angioma has undergone malignant degeneration, but suppuration after interference is more common. Whether hemangiomas become malignant has never been established definitely.

In treating hemangiomas, patent vascular channels may be obliterated by injection of sclerosing agents which results in reduction of the size and activity of the tumor. Cautery and treatment by electrolysis also have been used, but excision consistently gives the best results when it is not contraindicated by location or size of the tumor. In well demarcated masses, enucleation is in order.

A case is reported in which a preoperative tentative diagnosis of hemangioma with phlebolithiasis was made, based on the patient's history and clinical and roentgenographic examinations. This diagnosis was confirmed by postoperative histologic examination.—27 *State Street.*

■ PEGS

All words are pegs to hang ideas on.—*Henry Ward Beecher.*

Moistureproof pressure dressing for intraoral surgery

■ *Roger G. Gerry,* D.M.D., U. S. Navy, and Ingram W. Ogden,† D.D.S., Bainbridge, Md.*

Pressure dressings have been used after surgical procedures for many years. Pressure dressings stimulate rapid and uneventful repair of surgical wounds by eliminating the development of so-called dead spaces, which in turn inhibits hematoma formation and the accumulation of intercellular fluid in the surgical area. Early healing is also assisted by immobilization of the soft tissues involved in the surgical procedure.

Intraoral pressure dressings have not been used in the past because standard dressing materials rapidly become saturated with the oral fluids and can be retained in position over the surgical wound for only relatively short periods. During the past two years, the writers have been using condoms packed with surgical sponges to provide prolonged intraoral pressure. This type of dressing has been found to be satisfactory in all respects.

■ *Construction and Use*

The condoms first are autoclaved. At the time of the surgical procedure, a sterile 4 by 4 inch surgical sponge is folded in half, rolled in a cylinder and inserted into the condom. The excess air is then squeezed out, and a knot is tied at the open end (illustration, left). When indicated, larger sponges may be used to provide more bulky dressings. Actually, moistureproof packs of this sort may be prepared and autoclaved in advance, but the open end of the condom should not be knotted before autoclaving, since moisture tends to accumulate on the inside.

In practice, the moistureproof dressing is placed over the elevated soft tissue flap, and is immobilized in this position by means of a standard facial pressure dressing, usually of the Barton type, which utilizes a pad of gauze "fluffs" and elastic roller bandage (illustration, right).

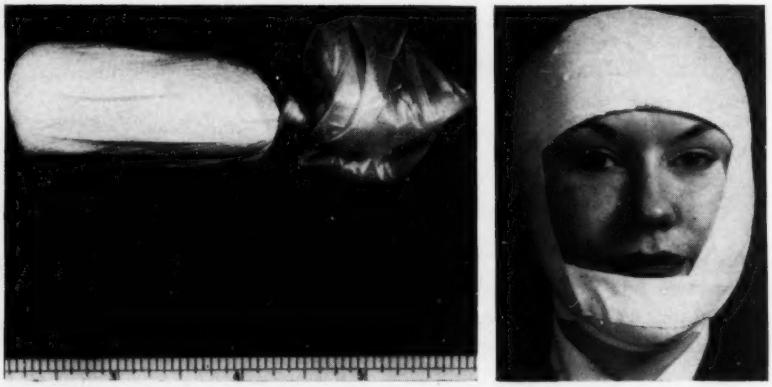
To date, this type of moistureproof pressure dressing has been used routinely after the removal of deeply impacted mandibular third molars, alveolectomies and repair of oroantral fistulas. It has also been used in other procedures in which a "dead space" must be eliminated or in which a soft tissue flap has been raised. In some procedures, as in extensive alveolectomies, in which the pressure dressing used was not quite large enough to cover the entire operative site, a sharp line of demarcation could be seen which separated the firm, pink mucosa over

The opinions or assertions contained in this article are the private ones of the writers and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

*Captain, Dental Corps, U. S. Navy, U. S. Naval Hospital No. 3923.

†Commander, Dental Corps, U. S. Navy.

From the section on oral surgery, U. S. Naval Hospital, St. Albans, New York.



Left: Moistureproof intraoral dressing. Right: Facial pressure dressing used to immobilize mandible and cheek and to retain intraoral moistureproof pressure dressing in position. In women, elastic bandage is usually applied over surgical scrub cap

which adequate pressure had been maintained from the reddened, edematous tissues which remained uncovered.

This type of moistureproof dressing has been used most extensively after the removal of completely unerupted mandibular third molars. In such instances, the pressure was maintained for approximately 24 hours. The great majority of patients managed in this manner have been symptom-free on the first day after the extraction. Approximately 2 per cent have exhibited the common postextraction sequelae of trismus, edema or pain. After the closure of an oroantral fistula, or the migration of a mucous membrane flap to cover an area of excised leukoplakia, pressure usually is maintained for two days or longer.

This type of dressing also has been found to be extremely useful as a temporary obturator after maxillary resection. In these instances, it maintains adequate pressure against the split-thickness skin grafts, and at the same time substantially assists in maintaining adequate nutrition and phonation until a permanent prosthesis can be provided.

■ *Summary and Conclusions*

1. Pressure dressings, when used intraorally, aid the healing of surgical wounds by preventing hematoma formation and the accumulation of intercellular fluid and by immobilizing the soft tissues involved in the surgical procedure.

2. A sterile condom, packed with surgical sponges, has proved to be an adequate pressure pack after intraoral surgery. Since a dressing of this kind is not saturated by oral fluids, it may be maintained in position for as long a period as may be indicated.—*Fleet Post Office, San Francisco.*

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CASE REPORTS

Osteomyelitis of the mandible associated with supernumerary teeth: *report of case*

■ *David J. Kennedy, D.D.S., Syracuse, N. Y.*

A 61 year old man first came for treatment on September 27, 1950. On August 28 he had noticed some discomfort in the left side of his mandible. Increasingly severe pain had developed in the next few days, and on September 8 he had gone to a clinic where two mandibular incisors had been extracted. Three days later the mandibular cuspid on the left side was extracted and he became fairly comfortable. On September 18 he had returned for extraction of the second mandibular cuspid; however, because of a purulent discharge at the site of the previous extractions, the remaining cuspid was not removed. The wounds were irrigated and a mouthwash prescribed; the patient became more comfortable but the discharge continued. On September 26 he had returned for examination, but because of the persisting symptoms, he was referred to the writer for care.

EXAMINATION—The patient appeared to be in good general health and looked considerably younger than his 61 years. The right side of his face was completely paralyzed. A two inch scar was noted anterior to the ear, and a six inch cervical scar extended from the right mastoid process to the submental region. There were few teeth present, and only one, the cuspid on the right side, remained in the mandible. The mucosa was normal except for a pronounced inflammatory change that surrounded three discharging sinuses in the mandibular left central incisor, cuspid and first bicuspid regions. Digital pressure on the buccal mucosa produced a purulent discharge. There was no detectable cervical adenopathy. Anesthesia was present on the left side of the lip and chin. Posteroanterior and left lateral jaw roentgenograms were taken (Fig. 1), in addition to intraoral views. Several calcified objects were noted in the anterior mandible, and bone destruction was evident between this site and the left bicuspid area. A diagnosis of unerupted teeth and acute osteomyelitis was made.

PAST HISTORY—When the patient was questioned relative to the scars on his face and neck, he stated that in 1940 he had developed a cervical swelling. Incision and drainage had been performed on two occasions, and the facial paralysis dated back to this surgery. Temporary improvement had followed, but in two weeks coughing had developed and he was admitted to a tuberculosis sanitarium. A diagnosis of cervical and lung actinomycosis was made.

TREATMENT—In view of the past history of actinomycosis, it became essential that this possibility be ruled out. A smear was taken and culture made of the oral discharge which were reported as negative for actinomyces. Blood and urine examinations were within normal limits, and the Kahn test was negative.

The draining sinuses were irrigated daily with potassium permanganate solution, and the patient was instructed to use frequent hot saline

Fig. 1—Lateral view of left side of mandible showing area of osteomyelitic destruction and three supernumerary unerupted teeth

irrigations at home. He was placed on intramuscular penicillin therapy, but because of a continued purulent discharge, this was augmented on October 4 with Sulfonamide Triplex.

On October 2 a loose fragment of bone was lifted out of the cuspid region. The pathologist's report on this specimen was "purulent osteomyelitis." On October 12, discharge had ceased and a sequestrectomy was performed under local anesthesia. The incision was started in the lower left first molar region, carried lingually to the crest of the ridge to the right lateral incisor region, and then down to the mucobuccal fold. On raising this flap, a great amount of necrotic granulation tissue was found along with numerous small fragments of necrotic bone. There appeared to be two main regions of destruction, one in the bicuspid-cuspid region and the other in the incisor region. The posterior part was curetted and a large defect was disclosed in the medullary portion of the bone, but the cortical plates were intact. No trace of the inferior alveolar vessels or nerve was seen, except for a fringe of soft tissue in the posterior-inferior portion of the cavity and those emerging from the mental foramen. Two inverted supernumerary teeth were uncovered when the anterior defect was curetted. Medial and inferior to these teeth, a large incisor crown was discovered lying in an oblique position. It was firmly entrenched and, since bone destruction was so extensive, the possibility of fracturing the mandible presented a serious threat during its removal. To prevent this, the tooth was sectioned with a fissure bur and removed in fragments. The wound was sutured and a rubber drain inserted. Penicillin was continued until October 18.

POSTOPERATIVE COURSE—Healing progressed normally with minimal discomfort. The pathology report on the tissue specimen was "osteomyelitis of the mandible." Complete sensation returned to the lip and chin after several months. Postoperative roentgenograms taken in August 1951 showed the progress of bone regeneration (Fig. 2).

COMMENT—In view of the patient's history, a diagnosis of osteomyelitis could be established only after first ruling out the existence of actinomycosis. Etiology of the osteomyelitis was confused by the presence of the unerupted supernumerary teeth. The following theories may explain the condition:

Fig. 2—View of left side of mandible taken in August 1951 showing excellent bone regeneration

1. Periapical infection about the teeth which were initially extracted could have led to dissemination of infection in the bone leading to osteomyelitis.

2. A low grade infection may have been present in the follicular tissue about the crowns of the unerupted teeth. Either the trauma associated with the extractions or the decreased vitality of the tissues because of the periapical infection may have instituted an acute flareup of the infection.

In view of the existence of two separate regions of bone destruction, it seems likely that the cuspid was responsible for the posterior region of infection and the incisors and the unerupted supernumeraries for the anterior region.

Anesthesia of the lip and chin is a frequent manifestation of osteomyelitis of the mandible. The safest and most effective therapy for osteomyelitis of the mandible is first to eliminate the acute phase by establishing drainage, to be followed by other chemotherapy. After the infection has been brought under control, the involved region can be opened surgically and the infected defect curetted free of debris and sequestrums. Such conservative therapy usually is highly successful.—*415 Wilson Building.*

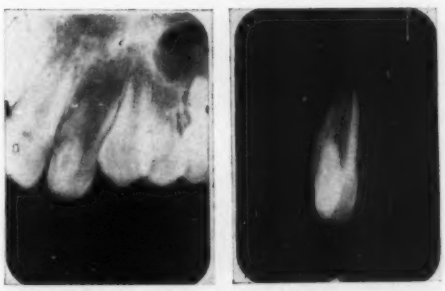
Dens in dente: *report of case*

■ *Walton Shannon, D.D.S., Jackson, Miss.*

Dens in dente is a relatively rare condition with but few cases reported in the literature.[1] The following is a description of a typical instance that was treated recently.

The patient, a white child, nine years of age, was first seen Aug. 18, 1955. She gave the history of recurrent drainage in the right anterior maxilla. The examination revealed a fistulous tract which made its exit through the mucoperiosteum in the region of the root apex of the maxillary right lateral incisor. Subsequent roentgenographic examination of the region revealed a diffuse osteolytic change surrounding the apex of the root of the maxillary right lateral incisor (illustration, left). An apparent dens in dente was also evident.

The lateral incisor was extracted and the impression of dens in dente was substantiated. This was corroborated by postoperative roentgenographic examination of the specimen (illustration, right). The surgical region healed uneventfully, and there has been no recurrence of symptoms or drainage since that time.—*Lamar Life Building.*



Left: Nonvital infected maxillary right lateral incisor showing typical dens in dente. Right: Postoperative view which corroborated impression of dens in dente.

1. Thoma, Kurt H. Oral pathology, ed. 4. St. Louis, C. V. Mosby Co., 1954, p. 70.

Lingual nerve neuropathy resulting from sialolithiasis: *report of case*

■ *Donald E. Cooksey, D.D.S., M.S., Bethesda, Md.*

The patient, a 26 year old sailor, was first seen at the U. S. Naval Hospital, Bethesda, Md., on November 3, 1954. He complained of pain and tenderness of the left side of the tongue, floor of the mouth, and of swelling and pain in the left submaxillary salivary gland.

His illness dated back eight months when he had first noted a swelling in the submaxillary gland region at mealtimes. He sought aid for this complaint, and was told he had a calculus in his left submaxillary salivary duct, which was subsequently removed transorally under local anesthesia. The wound healed well and his symptoms remitted for several weeks. At that time, however, he noted increasing discomfort referrable to his tongue, and the submaxillary gland became hard and tender. He returned for further consultation and was informed that he had an infection of the submaxillary gland. He was placed on penicillin therapy, but this failed to alleviate the pain or swelling, and he was therefore advised that it would be necessary to remove the gland.

He was referred to us for evaluation and treatment.

PAST HISTORY AND FAMILY HISTORY—His past and family history contributed no information other than that referrable to his current complaint.

PHYSICAL EXAMINATION—General physical examination revealed a short, slight man with a very distressed appearance. He was responsive and intelligent but somewhat hypersensitive to all stimuli. He gave the impression of having considerable emotional investment in his current illness.

Other positive physical findings were confined to a hard nodular mass in the left submaxillary triangle. It was discrete, movable and slightly painful to palpation.

Oral examination revealed a healed scar in the left posterior floor of the mouth opposite the second molar. The scar and the lateral portion of the tongue were very tender. The patient volunteered the information that the tongue burned and tingled continuously to the extent that it kept him awake.

Intraoral and extraoral roentgenograms revealed no evidence of a submaxillary duct calculus.

LABORATORY EXAMINATIONS — Laboratory examinations consisting of complete blood count, Kahn test, chest roentgenograms, urinalysis, and electroencephalogram were within normal limits.

TREATMENT AND RESULTS—It was believed that the patient's complaints were the result of fibrosis at the old operative site, which had restricted secretion from the submaxillary salivary gland. The burning pain in the tongue was believed to be exaggerated because of the volatile emotional character of the patient. On Nov. 9, 1954, a sialogram was done by cannulizing the left submaxillary duct and injecting 1.5 cc. of iodized oil into the system. Lateral jaw roentgenograms were taken, revealing the outline of the submaxillary gland and duct system (Fig. 1).

The roentgenograms were carefully evaluated and a stricture of the duct was noted at

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Captain, Dental Corps, U.S. Navy; chief oral surgery division, U.S. Naval Dental School, National Naval Medical Center.

the hilus. There was slight clubbing of the terminal acini throughout the gland, interpreted to be moderate sialoadenopathy. It was not believed that the defects noted could account fully for the symptoms described, and the possibility of psychic factors was again considered. The possibility of extrinsic tumor of the gland was discussed but was not acted on at the time. The patient was placed on antibiotic therapy consisting of 300,000 units of procaine penicillin, twice daily, and was seen daily in clinic.

A week after the sialogram, the patient admitted a remission of his symptoms. It was felt that the medicated oil employed in sialography had had a helpful effect on the gland substance, and that the pressure of injection had dilated the stricture.

The patient was dismissed from the hospital on Nov. 20, with instructions to return if there was recurrence of the symptoms.

On Jan. 3, 1955, he returned to the hospital with recurrence of symptoms which he described as increased over those present at the time of the former admission. All findings, including repetition of sialogram, remained the same except for an apparent increase in tenderness of the tongue and submaxillary gland. The patient requested that the gland be removed and because of the intractability of symptoms it was decided to proceed with its removal.

Fig. 1—Preoperative sialogram demonstrating slight stricture of duct, behind which is some dilation of the glandular ductiles. There is minimal dilation of terminal acini and no stone

OPERATION—Intravenous thiopental sodium and anectine was administered for induction. An intratracheal tube was inserted, and the intravenous anesthetic was supplemented with nitrous oxide and oxygen.

An incision was made at the lower border of the submaxillary space, directly over the inferior pole of the gland. The skin bleeders were clamped and tied, and the platysma muscle was sectioned and retracted. The anterior facial vein was located and ligated and sectioned. The lower pole of the gland was exposed and the dissection was carried bluntly down to the tendon of the digastric muscle. The gland was grasped with Allyce forceps and was retracted anteriorly. The posterior pole was freed by blunt dissection. The external maxillary artery was visualized as it passed under the stylohyoid muscle and was displaced medially, revealing the branches to the submaxillary gland. These branches were clamped, ligated, and sectioned. The superior and medial surfaces of the superficial portion of the gland were freed by blunt dissection, and the gland was retracted to expose the fascial investment of the lingual nerve.

The gland was then retracted posteriorly to expose its deep portion from its position superior to the mylohyoid muscle which allowed visualization of the duct. At this time it was noted that the duct and the hilus of the gland were involved in very firm fibrous adhesions that appeared to be attached to the floor of the mouth, and their dissection proceeded with difficulty. At this time the specimen appeared to have two ducts, and since this was considered most unlikely, the adhering structure was dissected posteriorly until it could be identified as the lingual nerve. It was carefully freed from the duct and the investing fascia and allowed to return to its normal position. The duct was clamped, doubly ligated, and sectioned, and the specimen removed.

The wound was closed in layers using catgut sutures for the deep structures and no. 000000 silk for the final approximation of the skin.

The patient's postoperative course was uneventful and was marked only by ever decreasing pain in his tongue and the floor of his mouth, and some discomfort in swallowing. By the fifth postoperative day he was free of pain, and on the seventh postoperative day all sutures and dressings were removed (Fig. 2).

The specimen consisting of the entire submaxillary salivary gland and the posterior portion of the duct was sectioned and examined microscopically.

Microscopic diagnosis was chronic sialadenitis, submaxillary gland.

The patient was discharged from the hospital on the tenth postoperative day, feeling well and free of symptoms.

SUMMARY AND CONCLUSIONS—A case is reported in which lingual nerve neuropathy was produced after an operation for removal of a submaxillary duct calculus.

The condition was complicated by psychic factors which rendered accurate diagnosis difficult. Proper diagnosis was reached at the time of surgery, however, permitting proper treatment to be rendered.

In retrospect, the operator feels that this condition was diagnosed with little imagination. Although a fibrosis was correctly assessed as the etiologic factor producing this pain, the basis for the pain was thought to be back pressure and stasis with supervening infection as a result of the stricture. Even though this idea was not completely substantiated by the sialogram, the obvious lingual nerve symptoms were regarded as overemphasis by an emotional patient. As a result of this poor estimate, surgery was undertaken without consideration of the possibility that the lingual nerve itself was involved in the process.

Review of the case permits a ready explanation of all factors on the basis of sound anatomy.

1. Onset of symptoms after the first surgical intervention was in accordance with the time necessary for the formation of dense adhesions.

2. Glossodynia is readily attributable to involvement of sensory fibers of the lingual branch of the mandibular division of the fifth cranial nerve.

3. Pain in the lingual mucosa and floor of the mouth could be brought about by the same mechanism.

4. The hard firm character of the gland, accompanied by pain and periodic remissions, may be explained on the basis of reflex hypersecretion, particularly of mucin, as a result of stimulus to the lingual nerve. This hypersecretion of fluid drained poorly past the region of stricture and produced stasis, fullness and tension in the gland. Retrograde infection of a chronic nature doubtless supervened in the pooled fluid, accounting for the microscopic changes noted in the gland.

It is fortunate that good access and exposure and unhurried dissection permitted the diagnosis to be made at the time of operation, and that the lingual nerve was not sectioned

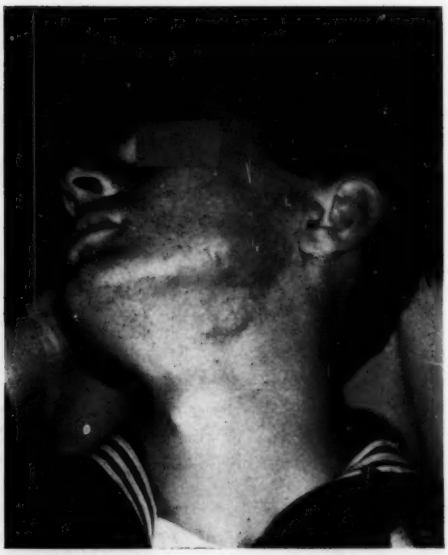


Fig. 2—Appearance of incision on tenth postoperative day. Employment of multiple layer closure followed by application of pressure dressings closed dead space and eliminated need for a drain

along with the duct on removal of the gland.

It is believed that, had the diagnosis been accurately made prior to operation, no alteration in the over-all procedure could have been made. The difficulties involved in freeing the nerve by dissection through the floor of the mouth seemed almost insuperable, while approach through the submaxillary space would inevitably so damage the gland as to require its removal. The procedure, therefore, is believed to be adequate and correct.

The difficulties inherent in evaluating the symptoms of emotional patients is well known. It is frequently necessary to sift through quantities of complaints and bizarre symptomatology to arrive at a reasonable conclusion. For this reason, the clinician may tend to jump to conclusions to avoid emotional involvement and to save time. Careful notation and evaluation by the clinician aids in separating hysterical complaints from those based on sound anatomic and physiologic principles.

Persistent trismus caused by a foreign body: *report of two cases*

■ *Marvin Revzin,* D.D.S., and Frank Monaco, D.D.S., Detroit*

Lack of adequate mandibular excursion may be caused by various conditions. Afflictions of the temporomandibular joint and chronic infections in the tissues surrounding the ramus of the mandible are most frequently noted etiologic agents. Foreign bodies accidentally introduced into the joint region also may be productive of chronic trismus. It is wise, therefore, to seek evidence of injury when obtaining the case history and also to search the skin carefully for evidence of a previous portal of entry of a foreign body. Roentgenographic study in such cases is imperative. The following reports illustrate these points.

CASE 1—In September 1949, a negro man, 60 years of age, came to the oral surgery department with the chief complaint of painful teeth. Clinical examination showed that the patient was unable to open his mouth sufficiently to afford an adequate intraoral investigation. He stated that he had been unable to open his mouth normally for approximately two years. He had not been able to partake of solid food during this time; apparently he was well nourished, however, although he had taken all of his nutrients in liquid form.

ROENTGENOGRAPHIC EXAMINATION—Extraoral roentgenograms were taken which consisted of right and left lateral views and an anteroposterior view of the skull. These revealed, in addition to carious teeth, a foreign object which appeared to be a knife blade. In a lateral position, the blade extended in an oblique direction from the maxillary sinus to the mandible (Fig. 1, left). An area of radiolucency was present at the point of contact with the mandible.

PAST HISTORY—The patient stated that seven years prior to his visit to the oral surgery clinic, he had been struck in the face with a

*Henry Ford Hospital.

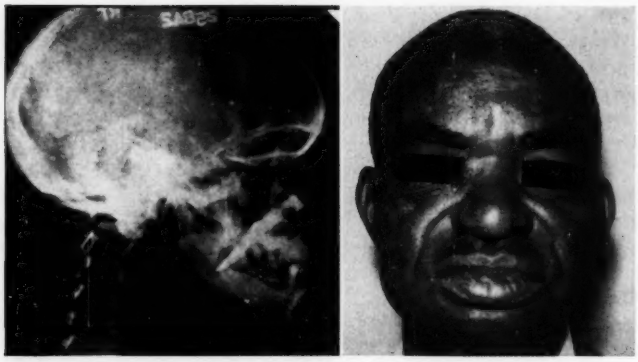


Fig. 1—Case 1. Left: Preoperative lateral skull roentgenogram which revealed knife blade. Right: Preoperative appearance of patient

knife. He remembered profuse bleeding at the time and that he had sought medical attention but he did not remember what had happened to the knife blade in the confusion. He stated that aside from the pain which he normally expected from such a blow, there had been no unusual symptoms. Two years after the accident, the patient sustained a cerebral vascular accident which left him with hemiplegia of the left side. From the time of the cerebral vascular accident, he had begun to notice an inability to open his mouth which he attributed to his stroke.

PHYSICAL EXAMINATION—The patient was a well nourished negro man with hemiplegia of the facial muscles on the left side, and with a scar beginning at the inner canthus of the right eye and extending downward and laterally for approximately 2 cm. Otherwise he presented a picture of a man in no acute distress or illness.

HOSPITAL TREATMENT—The patient was admitted to the hospital and a complete laboratory and physical examination performed. These revealed no abnormalities other than those previously noted. It was felt that in order to give the patient relief from the pain of dental origin, and to remove the oral sepsis present, complete dental extractions were indicated. Extraoral anesthetic injections were given and the teeth were removed surgically. After primary healing, plans were made for the removal of the knife blade. At the time of the operation the skin was prepared in a sterile manner and the patient draped. Under local anesthesia, an incision designed to remove the old scar wound was made from the inner canthus of the right eye, avoiding the lacrimal duct, and extending laterally and inferiorly to a position short of the angular vein. By blunt dissection the knife blade was exposed (Fig. 2). It was removed intact in a direction opposite to the original line of insertion. There was very little bleeding from this procedure, and the wound was closed in layers. A postoperative pressure bandage was applied to the face. Penicillin therapy was instituted and recovery was uneventful. The patient was discharged from the hospital on the fourth postoperative day.

CASE 2—On October 28, 1952, a 34 year old negro woman came for an examination. She gave the history of having been struck on the side of the head eight weeks previously. At that time she had received emergency care. A laceration in the left zygomatic-temporal region had been débrided and sutured. Almost immediately after this incident, she began to feel vague discomfort radiating forward from the wound site. She was unable to open her mouth more than 1 cm., and she developed

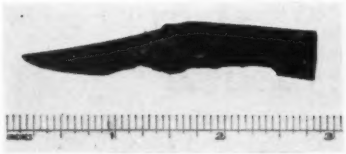


Fig. 2—Case 1. Knife blade which was removed

rhinolalia aperta. She also reported occasional bleeding from the nose and mouth. An ear, nose and throat examination revealed no obvious reason for the speech defect, the bleeding or the trismus. She was therefore sent to the oral surgery department.

HOSPITAL EXAMINATION—The patient was a very tall, well-developed negro woman who appeared uncomfortable but not acutely distressed. Routine laboratory tests were all within normal limits. Examination by systems revealed a mass in the abdomen. This was later diagnosed as a myoma, and a proper referral was made to the gynecology department. The other systems were normal in every respect.

Oral examination revealed trismus which limited the jaw opening to 1 cm. (Fig. 3). Any attempt to force greater opening was accompanied by pain in the temporomandibular joint region. By means of a flattened mouth mirror it was possible to visualize some of the oral cavity proper, but this examination was unsatisfactory and unrevealing.

SPEECH EXAMINATION—The patient was able to reproduce in isolation some of the speech sounds which were faulty in conversation. For example, she was able to effect a good oropharyngeal closure for the sounds "g," "k" and to some extent the sibilant "s." These sounds were produced with difficulty and only in isolation. She had nasal emission of air on all of these sounds in conversation, indicating some velar interference in achieving the necessary oronasal or oropharyngeal closure.

ROENTGENOGRAPHIC EXAMINATION — Thorough roentgenographic examination was done which included anteroposterior and Waters' views. These revealed a knife blade approximately two and one half inches long embedded in the frontal infratemporal fossa, beneath the zygomatic arch about one and one half inches from the skin surface. The distal or lateral end of the knife appeared to lie in the mandibular notch, while the medial end or point of the knife appeared to be in the midline (Fig. 4).

OPERATION—The foreign body was removed under general anesthesia. A vertical incision was made through the old scar. This incision extended over the zygomatic arch and was made half way between the helix of the ear and the lateral canthus of the left eye. By blunt dissection, the malar bone was exposed. By blunt probing and needle exploration, the foreign body was located. It was found to be inferior, medial and posterior to the zygomatic bone. It was grasped and withdrawn in its original line of insertion and was found to be a knife blade three inches long (Fig. 5). Brisk venous hemorrhage was then controlled with pressure by packing the cavity. The wound was closed in layers and a rubber drain inserted.

Fig. 3—Case 2. Preoperative photograph showing limited jaw opening

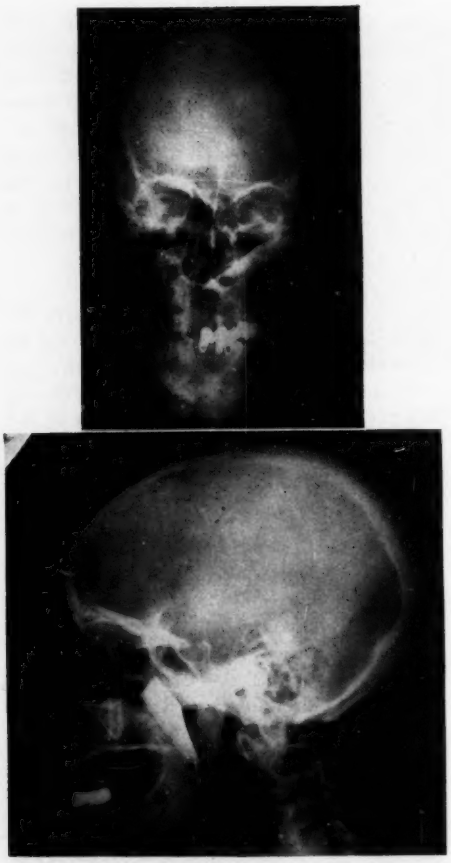


Fig. 4—Case 2. Above: Preoperative posteroanterior roentgenogram showing position of knife blade. Below: Preoperative lateral skull roentgenogram showing position of knife blade

A pressure bandage was applied to the face.

The patient's postoperative course was uneventful, and she was discharged on the third postoperative day. Follow-up examinations in the out-patient clinic were carried out once a week for the first month after her discharge from the hospital. The examinations revealed complete relief from all of the preoperative symptoms and clinical signs. Her speech returned to what was normal for her, trismus disappeared, and she was able to open her mouth without pain.

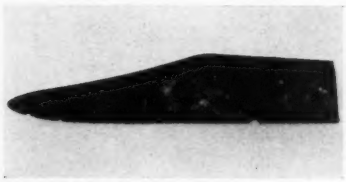


Fig. 5—Case 2. Knife blade which was removed

SUMMARY—Two patients were seen who gave a history of having been struck in the face with a knife previously. In both instances it was only after roentgenographic examination had been completed that the cause of the patient's distress became apparent. In Case 1 an unusually long period of time had elapsed before the foreign object was removed. The patient's condition was complicated by a superimposed cerebral vascular accident which caused a contralateral hemiplegia and possibly made the diagnosis more difficult.

In Case 2, an unusual circumstance of a foreign object which directly interfered with normal speech production was encountered. The reason for the speech deficiency was a mechanical impairment of the oronasal and oropharyngeal closure. The inability of the patient to open her mouth likewise was caused mechanically because the knife blade had lodged in the mandibular notch, thereby acting as a wedge which interfered with the downward and forward excursion of the mandible.

Midline fissure of the lower lip: *report of case*

■ *Charles C. Alling, D.D.S., M.S., El Paso, Texas*

The midline fissure of the lower lip is of particular interest because of its persistence in the face of local or systemic medicinal therapy or a combination of both. A plastic procedure has been described that appears to remove the lesion effectively and to eliminate the cause.[1]

HISTORY—The patient came to the University Hospital, Ann Arbor, Mich., in January 1954 with a painful midline fissure of the lower lip. The onset had occurred four winters earlier when an alternately crusting and bleeding lesion had appeared at the midline in the vermilion zone of the lower lip. During the summer months the lesion repaired itself, and the region was quiescent only to have the recurrence of the lesion during the winters, which were spent in the northern United States. Various forms of antibiotic, chemotherapeutic and neutral ointments had been used to no avail. There was only an occasional remission of the lesion during the winters. Courses of systemic penicillin had had no effect on the lesion. When the region was in a state of exacerbation, the patient experienced considerable disability with respect to outdoor activities and to eating, as the fissure was painful to any stimulus.

The past medical history was noncontributory. The patient was on a well-balanced diet, had negative results on serologic tests and had no history of other mucosal or cutaneous lesions. The dental history likewise was negative; the patient had received excellent professional care all his life.

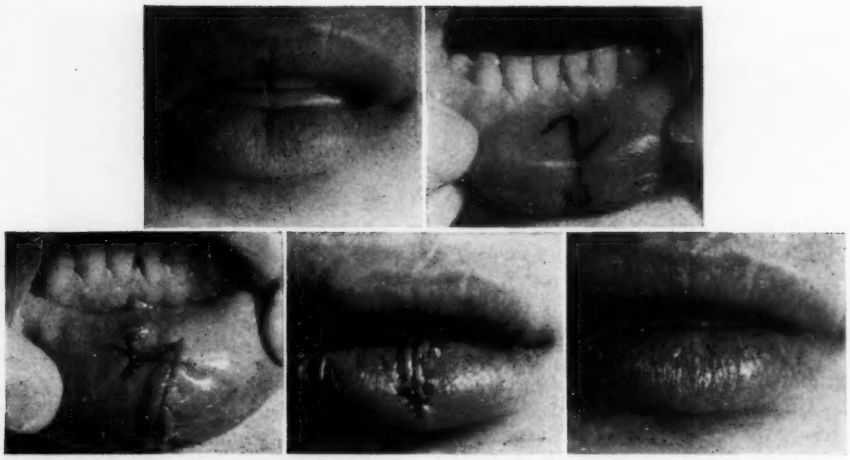
PHYSICAL EXAMINATION—The patient was a 31 year old Caucasian medical student with pain resulting from a midline fissure of his lower lip. The fissure was elliptical, measuring 5 mm. by 2 mm. at the time of the examination and had been 10 mm. by 2 mm. a week earlier, according to the patient. The fissure was covered by a yellowish red crust and bled readily when the crust was removed. The lesion and the surrounding area for 1 cm. were sensitive to palpation. There was no submental or submaxillary lymphadenopathy or lymphadenitis. There was a full complement of teeth in an excellent state of repair with a normal vertical dimension.

The diagnosis was developmental inflamed fissure of the lower lip (illustration, above left). The treatment plan was excision of the lesion and advancement of the mucosa of the lip toward the defect to obviate a postoperative depression in the midline which would predispose the patient to a recurrence of the fissure.

COURSE—On January 4, 1954, anesthesia was administered with 2 per cent procaine in bilateral mental blocks, and the incisions were plotted with methylene blue (illustration, above right). The lesion was excised down to the musculature of the lower lip by an elliptical incision extending laterally from the lesion about 2 or 3 mm. The posterior apex of the excision was extended in the midline posteriorly to a point above the mucolabial sulcus. Two arms were made to provide the triangular flaps for transposition. The mucosa was then undermined about the operative site, freeing the triangular flaps. The flaps were transposed and sutured into position with no. 00000

Lieutenant Colonel, Dental Corps, U. S. Army, William Beaumont Army Hospital.

1. Dingman, R. O. Chronic fissure of the lower lip. Plast. & Reconstruct. Surg. 3:613 Sept. 1948.



Above left: Developmental inflamed fissure of lower lip. Above right: Lines of incision for flaps and excision of lesion plotted in methylene blue. Below left: Closure of operative field showing transposal of Z-plasty triangular flaps. Below center: Closure of site of excision of fissured lesion. Below right: View 12 days postoperatively

monofilament nylon material on atraumatic needles. Single loop sutures were placed alternately with vertical mattress sutures (illustration, below left). The area of excision then was closed with horizontal mattress sutures (illustration, below center). The lip now appeared full in the central portion. The fullness may have been partly due to edema from surgical manipulation, but credit for the fullness is extended to the advancement of the mucosal tissue which relaxed the midline of the lip.

On the third postoperative day, January 7, alternate sutures were removed. During the interim the patient had applied petroleum jelly to the lines of incision. He had experienced no discomfort, and only a minimal amount of edema was present.

Eight days postoperatively the remaining sutures were removed; the course had continued to be comfortable and quiet. Twelve days postoperatively, the lower lip appeared full with no fissure, no inflammation and only minimal scarring to mark the operative site (illustration, below right).

The pathologic diagnosis was ". . . an inflammatory process with an infiltration of lymphocytes and plasma cells. Some polymorphonuclear leukocytes were seen in central area where an ulceration was present. There was no malignancy."

COMMENT—Fissures of the lip may be seen in many forms of cheilitis, but the phrase appears to have the connotation of an interruption of the vermilion zone in the midline of the lower lip. The etiology of these lesions is not the same as that of mechanical fissures due to loss of a vertical dimension of the dentition, or of perlèche (angular cheilosis) due to nutritional disturbances.[2]

The midline of the lower lip contains a natural depression visible in some persons and demonstrable in most persons when the lower lip is drawn in (although the same action will not cause a fissuring of the upper lip). It appears that fissured lesions are initiated in the midline depression by chapping of the lips as most commonly seen during the winter. A flow

2. Thoma, K. H. Oral diagnosis with suggestions for treatment, ed. 2. Philadelphia, W. B. Saunders Co., 1943, p. 495

of saliva across the midline with desquamation of the mucosa soon follows. In addition to being thus inflamed, the lesion can, of course, develop an infection from secondary oral organisms.

Dingman,[1] with reference to Smith,[3] described a logical, simple plastic procedure for correction of the fissure. The lesion is excised and a Z-plasty is performed on the mucosal side of the lip to allow an extra length of tissue to be available to the area of excision. The Z-plasty anticipates the loss of tissue due to the excision as well as the natural contraction of the scar of the excised region.

3. Smith, F. In manual of standard practice of plastic and maxillofacial surgery, National Research Council, Committee on surgery. Philadelphia, W. B. Saunders Co., 1942, p. 38, 39.

Treatment of persistent infection of the face and neck: *report of case*

■ *Daniel Verne, D.D.S., Cleveland*

Infections of the head and neck resulting from dental disease are bizarre, and in many instances are difficult to eliminate. The case reported herein required eight months of intermittent surgery and antibiotic therapy to eliminate all infection completely. Incision and drainage and parenteral antibiotics seemed to halt the infection temporarily only to have it recur at a later date. Local use of penicillin by continuous irrigation was subsequently instituted.

HISTORY—The patient, an undernourished woman of 60, came for an examination on July 31, 1947, with the chief complaint of pain and swelling of the left side of the face. The patient said that she had had very poor teeth for many years and had first noticed swelling in the left maxillary region 14 weeks prior to coming for an examination. Later the swelling moved inferiorly, and it became difficult for the patient to open her mouth. About one week before the patient was seen, an opening appeared in the left cheek just anterior to the masseter muscle. Suppurative material drained from this point (Fig. 1, left).

EXAMINATION—The teeth remaining in the patient's mouth were few and scattered. Caries was present as well as extreme periodontal disease.

The tonsils were present but showed no indication of infection. An indurated swelling was present on the left side of the face in the region of the masseter muscle and also in the region of the superior portion of the sternocleidomastoid muscle. A discharging sinus tract was present in the left cheek anterior to the masseter muscle. A physical examination by a physician did not reveal any pathologic condition related to the present infection. The patient was underweight but otherwise normal clinically. Roentgenographic study of the mandible revealed the presence of impacted lower third molars, but the jaw was otherwise normal with no evidence of osteomyelitis.

PREOPERATIVE TREATMENT—The patient was admitted to the hospital and a regime of 50,000 units of penicillin every three hours was instituted. Complete blood studies were done. They revealed the hemoglobin to be 58

per cent and the red blood cell count to be 3,260,000. The white blood cell count was 12,000. Sedimentation rate was 65 mm. the first hour and 103 mm. the second.

FIRST OPERATION—On September 2, 1947, an incision was made and drainage instituted. The incision was made parallel to, but approximately 2.5 cms. below, the inferior border of the angle of the mandible. From here the dissection was carried posteriorly into the region of swelling overlying the superior head of the sternocleidomastoid muscle and superiorly into the superficial portion of the masticator space. A great deal of suppurative material exuded from the opening.

The swelling receded considerably and the patient was able to open her jaws and move her neck more freely. However, a second abscess formed posterior to the ear and, although the patient showed some general improvement, the infection seemed to have extended into the temporal region.

Cultures from the first operation revealed moderate to no degenerative white blood cells, occasional gram positive cocci and a very slight growth of *Staphylococcus aureus*. The poor culture was probably due to the use of the preoperative antibiotic.

SECOND OPERATION—In order to drain the temporal region and the postauricular abscess, it was decided to place a through and through drain.

On September 7, an initial incision was made posterior and superior to the left ear. A second incision was made in the temporal region. A greenish, moderately viscous fluid exuded from the drainage points. The through and through drainage was instituted (Fig. 1, center). The drain from the first operation was examined but not removed.

On September 9, it was noticed that although the swellings in the head and neck had not receded to any extent, they were not as indurated as they had been preoperatively. The temporal postauricular drain was removed on September 12. The patient showed considerable improvement and was discharged from the hospital on September 15.

The masticator space drain was removed a week after discharge from the hospital; however, the patient again developed her previous symptoms of trismus, pain, and general malaise shortly after the drain was removed. The swelling in the masticator space increased. Administration of penicillin was begun, 50,000 units every three hours, and on September 17, a third operation was performed.

Fig. 1—Left: Appearance of patient at first visit. Opening anterior to masseter muscle on left side through which suppurative material was draining spontaneously. Center: Patient after second operation of incision and drainage. Through and through drainage in temporal region to relieve postauricular abscess. Submaxillary drain in place. Right: Amount of swelling present before fifth and last operation

THIRD OPERATION—An incision was made beneath the mandible and anterior to the sternocleidomastoid muscle. The skin was relieved and a curved hemostat introduced, which was followed by a blunt dissection of the lateral surface of the mandible and beneath the masseter muscle and then underneath the zygomatic arch. A second incision was made in the temporal region superior and anterior to the ear. Blunt dissection was extended beneath the zygomatic arch connecting with the dissection from below. A continuous Penrose rubber drain was then pulled through both incisions and a knot tied at both ends (Fig. 1, center). A great deal of suppurative material exuded from the inferior opening.

The Penrose drain was removed one week after operation. Swelling decreased and remained quiescent until the beginning of January, 1948, when evidence of suppuration again developed in the submaxillary and masticator spaces.

FOURTH OPERATION—On January 9, 1948, an elliptical incision was extended around the scar in the inframandibular region. Dissection was carried out into the submaxillary space and into the masticator space from which flowed a copious amount of pus. A rubber drain was placed with a knot at its proximal end.

Masticatory movements again improved until February 15, when all the old symptoms again appeared (Fig. 1, right). Before this last episode of inflammation occurred, the mandibular left third molar was removed under local anesthesia. About 2,000,000 units of penicillin were given in five days with no improvement. There was a dull type of pain in the head and neck region on the left side.

FIFTH OPERATION—On February 27, a drain was placed extending from the temporal incision out through the inframandibular excision. Again copious amounts of pus exuded from the opening. The swelling receded noticeably in two days, and trismus disappeared one week later. On March 6, the rubber drain was replaced with a perforated rubber drain and 200,000 units of penicillin in 100 cc. of distilled water was allowed to drip through the wound. This was accomplished by placing the penicillin in an intravenous bottle (Fig. 2). The tubing from the bottle ran to the temporal opening of the drain. This was allowed to drip through the drain and empty out of the submandibular opening at a very slow rate. This was repeated several times every day for three days until the tenth of March, at which time the drain was accidentally removed. The patient has been afebrile since that time.

Fig. 2—Continuous irrigation of penicillin into wound. Penicillin is placed in intravenous bottle and allowed to drip through a perforated rubber drain into the wound

Penicillin dosage was increased to 100,000 units every three hours and sulfanilamide was started at a dosage of 2 Gm. immediately and 1 Gm. every four hours. This was continued until the white blood cell count became depressed, at which time it was discontinued.

Medical consultation on March 2 revealed no evidence of a serious organic disorder. The blood picture remained relatively unchanged.

RESULTS—On February 27, the sedimentation rate was 75 mm. in the first hour and 114 mm. in the second hour. On March 19, for the first time since the treatment of the patient had begun, the sedimentation rate dropped to 34 mm. in the first hour and 64 mm. in the second

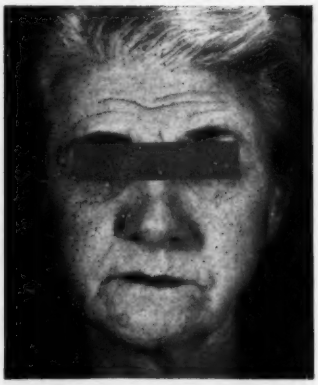


Fig. 3—Patient completely recovered

hour. Cultures of the discharge, as before, showed *Staphylococcus aureus*. The patient was discharged on March 22, with complete resolution of the swelling and cessation of drainage (Fig. 3) and to the date of this writing there has been no recurrence of the infection.

CONCLUSIONS—Deep infections of the head and neck require careful treatment. An intimate knowledge of the anatomy of the fascial planes and treatment of jaw infections with antibiotics is imperative.

It cannot be proved conclusively that the continuous irrigation with penicillin was the deciding factor in the treatment of this stubborn infection. A combination of surgical incision and drainage, parenteral administration of antibiotics and continuous irrigation of the infected region was necessary to eliminate the infection successfully.

The method of irrigation of the wound described can be used best when through and through drainage is used. Infections which lie in the space of the body of the mandible, the masticator and temporal spaces are the best qualified for such drainage and continuous penicillin irrigation.—*2010 East 102 Street.*

■ GOOD WRITING

How shall we judge of the goodness of a writing? Or what qualities should a writing have to be good and perfect in its kind?

Answer. . . . To be good, it ought to have a tendency to benefit the reader, by improving his virtue or his knowledge. But, not regarding the intention of the author, the method should be just; that is, it should proceed regularly from things known to things unknown, distinctly and clearly without confusion. The words used should be the most expressive that the language affords, provided that they are the most generally understood. Nothing should be expressed in two words that can be as well expressed in one; that is, no synonyms should be used, or very rarely, but the whole should be as short as possible, consistent with clearness; the words should be so placed as to be agreeable to the ear in reading; summarily, it should be smooth, clear, and short, for the contrary qualities are displeasing.

But, taking the query otherwise, an ill man may write an ill thing well; that is, having an evil design, he may use the properest style and arguments (considering who are to be readers) to attain his ends. In this sense, that is best wrote, which is best adapted for obtaining the end of the writer.—*Query for Discussion at Franklin's "Junto."*

VOLUME 14 • JULY 1956 • NUMBER 3 EDITORIALS

Metastatic cancer of the mandible

THE INCREASING INCIDENCE of metastatic carcinoma involving the mandible dictates the need for a greater awareness of this problem and an intelligent survey of modern therapy for its control. Cancer of the breast and prostate gland metastasize to bone, and the mandible may be involved at an early date. The cardinal symptoms of such metastatic disease, typified by transient discomfort or spontaneous anesthesia of one side of the lower lip, should immediately imply to the observer that a central metastatic lesion is present. Roentgenographic study followed by biopsy can then be utilized to substantiate the clinical impression.

Heretofore when a diagnosis of disseminated metastatic carcinoma was made, a fatal outcome could be expected. Fortunately, in neoplasms arising from the breast, current developments point to a more successful outcome.

That the metastases are hormonally dependent has been found by determining the response of calcium excretion to the administration of estrogen and testosterone. This knowledge opens the way to active and frequently successful therapy involving ovariectomy, cortisone therapy and in many cases, hypophysectomy. Such treatment frequently is followed by spontaneous recession of the metastatic lesions demonstrable in bone. Obviously, the success obtained by this therapy generates new hope in the management of an otherwise universally fatal disease.

Mandibular lesions that persist after such therapy, can, in the absence of other demonstrable metastases, be eradicated by radiotherapy or by surgically resecting the involved side of the mandible superior to the mandibular foramen and anterior to the mental foramen. Division of the mandible short of these points usually is fruitless, since it can be safely assumed that the entire canal is involved. Insertion of intramedullary splints or application of an immediate bone graft will do much to minimize the cosmetic and functional deformity and allow the patient to make an early return to relatively normal living.

The successful hormonal control of cancer of the breast has illustrated what can be achieved by an inquisitive yet aggressive attitude toward cancer. It is the obligation of the oral surgeon to be aware of the ever present possibility of metastatic disease and to cooperate fully in its local control.—*Fred A. Henny.*

■ Limitations of Local Anesthesia Because of Infection

Q.—What is the basis for contraindication of local anesthetic injections in areas of infection?

A.—The problem is the possible extension of the cellulitis by the injection procedure. In addition, local anesthetics are ineffective in inflamed regions because the low pH of the tissues prevents liberation of the active free base of the anesthetic. In addition, increased circulation in the region rapidly removes the anesthetic from the injection area. Inflammatory conditions in nerve fibers also reduce the effectiveness of local anesthetic action for reasons that are not entirely known.

■ Supernumerary Teeth

Q.—When should supernumerary teeth which delay the eruption of permanent incisors be removed in order to avoid damage to the developing normal teeth?

A.—Supernumerary teeth should be eliminated as soon as possible. Close proximity to incompletely developed roots of the permanent teeth may alter this decision in certain instances and postpone surgical intervention. Extreme care and minimal trauma are essential to the surgical intervention.

■ Local Tissue Conditions Before Immediate Denture Surgery

Q.—If a patient appears for an appointment for immediate denture surgery with rather characteristic herpetic lesions in the mucobuccal fold in the posterior region, should the planned surgery be postponed?

A.—Herpetic lesions occur in regions of localized lowered tissue resistance. Surgical intervention in such a mouth will result in open wounds and traumatized tissue which may be vulnerable to the invasion of the virus. The trauma of contact from a new denture will also contribute to the production of new lesions in such a mouth. Since the surgery is an elective procedure, the oral mucous membrane should be as healthy as possible at the time immediate denture service is rendered. Herpetic as well as other forms of stomatitis would therefore indicate a postponement of the surgery.

■ Removal of Partially Erupted Teeth

Q.—How do you routinely manage the pericoronitis problem in the young adult with a partially erupted and impacted lower third molar?

A.—The potential infection complications of this region demand respect. If the cellulitis is acute, the removal of the impaction should be postponed. Frequently an impingement from an opposing maxillary third molar aggravates the condition. This opposing tooth may be removed immediately. Drainage and irrigation of the pocket beneath the flap around the impacted tooth will assist in reducing the inflammatory reaction. Since most impaction surgery requires significant tissue intervention, preliminary treatment to reduce the pericoronitis reaction is helpful.

This section devoted to queries and comments from readers on topics of current interest to oral surgeons and general dental practitioners is edited by James R. Hayward, University Hospital, Ann Arbor, to whom readers are invited to send their communications. The answers, prepared by competent consultants, do not necessarily represent the opinions of any official scientific organization. Your participation in this section is invited.

The Editor

■ Technic for Sialograms

Q.—Is there a concise method of sialography which insures good filling of the duct systems of the submaxillary and parotid glands for contrast study?

A.—Adequate sialograms are needed where a diseased condition of the salivary glands is suspected. This important diagnostic aid is frequently neglected or improperly done because of technical difficulties encountered in cannulization, filling and retention of contrast media. Here is a simple method for execution of this diagnostic procedure which involves minimum equipment. The materials required are:

(1) several sizes of polyethylene tubing about 18 inches in length, one end of which has been sharply and smoothly beveled,
(2) a Luer-Lok connector of the type employed in continuous spinal anesthesia,
(3) a ring handle 3 cc. Luer-Lok syringe,
(4) a broken explorer, the end of which has been rounded and polished to be employed as a dilator,
(5) any radiopaque oil contrast media.

A suitable caliber length of polyethylene tubing is selected and fitted into the connector. The syringe is filled with contrast media, and the connector attached. All air is removed from the system. Extra oil will serve as lubricant.

The connector is detached, and the duct in question is cannulized. If pain is encountered, a few drops of local anesthetic around the duct papillae may be employed. If cannulization proves difficult, the explorer may be introduced to dilate the duct opening. Factors leading to difficulties in cannulization are:

(1) too large caliber tubing,
(2) rough bevel on tubing,
(3) short or blunt bevel on tubing,
(4) lack of lubrication on tubing.

The tubing is inserted well into the duct. In the parotid duct, an anatomical block is usually encountered where the duct turns posteriorly around the anterior border of the masseter muscle. In the submaxillary duct, a distance of three to four cm. is usually sufficient.

The patient is then asked to close his mouth and the tubing may be held in place through any convenient embrasure without crushing. The syringe is reconnected, and the patient instructed to hold it against his chest. In this way, the patient may be moved and positioned at the convenience of the roentgenologist. When the roentgenologist has positioned the patient to his satisfaction, injection of the media is started. The patient is instructed to raise his hand when pressure is felt, and again when definite pain is felt. The amounts of solution employed are subject to individual variation, and symptomatic filling is usually more reliable than predetermined amounts.

Pressure is maintained for ten seconds after pain is elicited, at which time the roentgenogram is taken. Light pressure is maintained during repositioning for additional views. Anteroposterior and lateral skull views may be taken at the discretion of the operator.

After all views are taken, the tube may be removed, and the patient instructed to assist in emptying the gland by massage. Residual oil in the gland and duct system is not harmful and may be beneficial in some low grade inflammatory processes.

■ Recurrent Epulis

Q.—A small tumor arising on the gingiva of a young adult has been excised twice and has recurred. It is closely associated with the gingiva around a central incisor. The pathology diagnosis has been benign peripheral giant cell tumor. What measures will assure complete removal at this time?

A.—This is one of several types of benign tumors of the blastomatoid variety which arise from tissues in the periosteum or periodontal membrane. A concerted effort should be made to excise the lesion to the level of bone. It is sometimes necessary to remove the intimately associated tooth in order to eliminate the periodontal membrane origin.

■ Fixed Partial Prosthesis. By Joseph E. Ewing. 208 pages with 482 illustrations. Price $6. Lea & Febiger, Philadelphia, 1954.

This book will be useful to dental students and dentists engaged in restorative dentistry. For the most part, the illustrations are realistic, and the explanations are clear and concise.

Chapter 4 entitled "Indications and Contraindications for Fixed Partial Prosthesis" is well done. Hydrocolloid technic for fixed partial prosthesis is not given sufficient emphasis. Nothing is mentioned regarding the proper method of waxing, finishing and subsequent polishing on stone dies prior to cementation.

Many technics mentioned and illustrated in the book are no longer used by operators who are skilled and have mastered the hydrocolloid technic for cavity preparation, impression taking, waxing, assembly of fixed bridge, and subsequent finishing and method of cementation. This technic, when mastered, tends toward far greater accuracy and saves time by reducing the number of steps.

These corrections are minor. The book is fundamentally sound, carefully planned and, for the most part, adequately illustrated. It is a valuable asset to the dental library.—*Gerald G. Wright.*

■ The Dentist and the Law. By Charles Wendell Carnahan, Ph.B., J.D., LL.M., Jur. Sc.D. First edition. 263 pages. Index. $5.25. St. Louis, C. V. Mosby Co., 1955.

In the preface, the author states that his objectives in writing this book are to impart to the practitioner an awareness of the legal problems connected with the practice of dentistry, to describe and explain the basic rules of law which the courts use in resolving these problems and to show the operation of legal rules in typical situations. In writing the book, the author has drawn on his experience in teaching a course in dental jurisprudence in the School of Dentistry of Washington University in St. Louis.

After explaining the nature, sources and divisions of the law and the judicial machinery in which it operates, the author discusses the basic legal duties that the practitioner owes to his patient as well as those owed by the patient to the practitioner. Among the subjects treated are the legal standards of skill required of the practitioner, the many aspects of the contractual relationship between the dentist and his patient, the concept of negligence and the legal doctrines surrounding malpractice suits.

Special sections are devoted to a discussion of the partnership arrangement and the legal responsibilities that the practitioner owes to persons other than his patients.

In addition there is an instructive chapter on the dentist as a witness in court. Of interest, too, is the chapter on the rules of evidence which govern the trial of malpractice actions as it points up the usefulness of maintaining certain records and procedures in office practice in order that the practitioner might be prepared better to assume successfully the burden of proof that the court would impose on him in such a lawsuit.

In summary, the book is an excellent survey of the law as applied to dental practice and, as such, fills a great void in present day dental literature. Its defects are those of emphasis in certain areas and are minor when compared to the many merits of the book.—*Howard N. Greenblatt.*

■ Medical Care for Tomorrow. By Michael M. Davis. 497 pages. Index. Appendix. $6.50. New York, Harper & Brothers, 1955.

How can dental service be incorporated in health insurance plans? Is the fee-for-service method of payment compatible with the scope of medical care now available? How much are we spending, and how much can we afford to

spend for medical care? Thoughtful discussion of such questions is found in this richly informative work. The early chapters delineate the basic elements in medical services: the needs and demands of consumers, health manpower, facilities, organization and finances. The middle section reviews the evolution of hospitals, clinics, group practices and professional societies. The final chapters attempt to define long-range goals which are at once socially useful and desirable for medicine and suggests guide lines for private and public action for attaining these objectives.

With clarity and candor Dr. Davis explores the potentials of voluntary and compulsory health insurance in terms of their costs, benefits and coverage. The book includes a detailed examination of various methods of organizing and financing medical care. In Appendix B the author surveys the place of dentistry in health insurance programs. Dr. Davis notes the current imbalance between resources and needs and stresses the importance of establishing priorities for children's dentistry and of expanding dental public health programs throughout the nation.

Written in nontechnical style, this book is essential reading for the layman to whom medical care and its costs have become matters of concern, as well as for the health professional to whom the social and economic issues of modern health service are unfamiliar. Balanced in its judgments and analyses, this is perhaps the most comprehensive single volume in the field today. *Medical Care for Tomorrow* enriches a literature notable in the past for its contentiousness.—*Samuel Herman.*

■ Differential Diagnosis of Leukoplakia, Leukokeratosis and Cancer in the Mouth. By Ashton L. Welsh, M.D. 62 pages. $2.50. Springfield, Ill., Charles C Thomas, 1955.

This five chapter monograph is designed to acquaint the reader with the salient features and differential diagnosis of the oral disease entities mentioned in its title. The material is organized in logical sequence, with the most benign disease presented first. A description is given of progressive changes in this disease which lead ultimately to malignancy.

The subject is timely and of significance to every practitioner dealing with oral disease. There is confusion in terminology, however, as the author vividly describes the classical picture of hyperkeratosis simplex under the heading leukoplakia. Likewise, what most oral pathologists regard as leukoplakia is in this writing termed leukokeratosis.

The chapter on cancer briefly reviews the principal characteristics of cancer as it occurs in various parts of the oral cavity. The chapter is preceded by a short description of the principal forms of oral cancer including the histopathology of these forms.

Chapter four is entitled "Differential Diagnosis" and includes a discussion of other oral lesions which appear as pearly-smooth patches and which may be confused with leukoplakia. Diseases are included, however, which in no manner clinically resemble the diseases that are the primary subject of the text.

Although the monograph is relatively short and readable, there is a tendency toward verbosity. The wordy descriptions do not compensate for the complete lack of illustrations and the informative value of the text is limited.—*Herbert J. Bloom.*

■ Modern Drug Encyclopedia and Therapeutic Index. Edited by Marion E. Howard, M.D. Sixth edition. 1,477 pages. Index. $15.00. New York, Drug Publications, Inc., 1955.

The Modern Drug Encyclopedia and Therapeutic Index is revised every few years. A bimonthly supplement providing descriptions of the newest drugs and a cumulative index is sent to purchasers of the book.

The products listed are mostly patented and trademarked brands available through drug stores. Some are prescription items; some are available over the counter. Product descriptions, actions and uses, routes of administration, dosages and commercially available dosage forms are given.

In addition to the descriptive matter, there is a therapeutic index, a generic name index,

a manufacturers' and distributors' index and a general index. In the present edition, generic names are not emphasized, and the index to generic names is likely to be overlooked by the reader. The generic name index and general index might well be combined in future editions.

Although listing is by trade mark name in most instances, many trade marked brands are not included. The substantial identity of some drugs is not always made obvious to the reader. In at least one instance two which are the same drug are described separately. Several brands of the antibiotic tetracycline are listed in different parts of the book without direct cross-reference.

The criteria used in selecting products for listing are not revealed in the book. Apparently drug houses who distribute products on a nationwide basis supply the bulk of the descriptive material. Such information is usually reliable, although not always critical.

The Modern Drug Encyclopedia represents an effort to meet a real need by means of a compact volume plus convenient supplements. It is a useful reference book.—*Donald A. Wallace.*

■ PRINCIPLES OF INTERNAL MEDICINE. Edited by T. R. Harrison, Raymond D. Adams, William H. Resnik, Paul B. Beeson, George W. Thorn and M. M. Wintrobe. 1,703 pages with illustrations. Index. $16. New York, McGraw-Hill Book Co., Inc., 1954.

This really modern book discusses disease from the current clinical and scientific concepts of internal medicine. Each systemic disorder is approached not only from the standpoint of structure and dysfunction of the organ but also from the standpoint of abnormal physiology, chemistry and psychology. Such an approach is indispensable for understanding of the development, evolution and management of any disease.

After a preliminary discussion of a proper approach to the patient, the authors formulate the functional approach to the principles of medicine. Such an approach is invaluable in medical, dental and surgical practice, for no single process or part of the body is in any way dissociated from the total organism.

Part I of the book gives the cardinal manifestations of disease; Part II, physiological considerations germane to medicine; Part III, reactions to stress; Part IV, metabolic and endocrine disorders; Part V, chemical disorders; Part VI, physical disorders, and Part VII, diseases of organic systems.

The dentist will be particularly interested in the discussions of the patient in relation to the doctor, evaluation of pain originating from various sources, metabolic mechanisms in diseases emanating from the oral cavity, hemorrhagic disorders accompanying oral disease, facial manifestations of systemic disorders and in the chapters on clinical entities involved in dental practice.—*I. Newton Kugelmass.*

■ FACIAL DEFORMITIES AND PLASTIC SURGERY: A PSYCHOSOCIAL STUDY. By Frances Cooke MacGregor, M.A.; Theodora M. Abel, Ph.D.; Albert Bryt, M.D.; Edith Lauer, and Serena Weissmann, M.S. 230 pages with 4 illustrations. Index. Appendix. Price $5.75. Springfield, Ill., Charles C Thomas, 1953.

In this book directed to those interested in contributing to solutions of the problems of the facially disfigured, the authors are the first to deal professionally with the many aspects of facial disfigurement in our culture. The book is the result of interdisciplinary research conducted by specialists in cultural anthropology, clinical psychology, psychiatry and sociology.

The book is based on the concept that mild disfigurement as well as severe disfigurement have profound psychological effects. The personality structure of the individual and society's attitude toward disfigurement are crucial to the handling of the disfigurement.

The conclusions drawn are based on extensive individual interviews with facially disfigured children and adults and their families. Interviews were made before, during, and after plastic surgery. The sample contained a wide range of ages and socioeconomic groups. The surgical, social, psychological and economic

ramifications of facial disfigurement are studied.

The book is written in clear comprehensive style, and throughout one is impressed with its simplicity and effectiveness. The list of references will be helpful to those who wish to study the subject in more detail.—*E. Alan Lieban.*

■ LIETFADEN DER KIEFERBRUCHBEHANDLUNG (GUIDE TO THE TREATMENT OF JAW FRACTURES). By Erwin Reichenbach, Dr. Med. Dent. Sixth edition. 192 pages with 387 illustrations. Index. Price 14 German Marks. Leipzig, Germany, Johann Ambrosius Barth, 1954.

The first edition of this book was published in 1935 and since then the book has been revised several times. It is directed to the dental student as well as to the dentist in general practice who occasionally has to treat jaw fractures. Therefore, the author has laid particular stress on simplified treatment methods, and more complicated methods have been discussed superficially. This sixth edition has been revised and contains new illustrations. The discussion on jaw fractures of children has been expanded and has been put together in a special chapter.

The importance of careful examination and diagnosis is emphasized. Descriptions are given of complications which occur in connection with jaw fractures. The histology of healing is discussed as well as general principles for treatment of jaw fractures, types of instruments and appliances and fixation bandages for different types of fractures in dentulous and edentulous jaws.

Special difficulties encountered in the construction of good immobilization appliances for children who have mixed dentition are mentioned, and the author describes an acrylic splint for this purpose. A careful treatment of the soft tissue along with treatment of the fractures is emphasized.

The use of antibiotics is poorly described. As these agents play an important part in the treatment of jaw fractures, more space should be given to them.

References in the text are almost entirely confined to German literature, but at the end of the book there is a fine index of books and articles published since 1940 in Europe and America. The book is well written and easy to read and is a valuable contribution to the dentist who wants to know more in this specific field of dentistry.—*Nils A. Nordh.*

■ MIKROBIOLOGIE DER MUNDHÖHLE (MICROBIOLOGY OF THE ORAL CAVITY). By Ulrich Berger. 266 pages with 83 illustrations. Index. DM 27. Munich, Germany, Urban und Schwarzenberg, 1955.

In these overspecialized times of ours, it is pleasant to review a book whose author gives a synthesis of the vast biologic material collected in scientific laboratories. This comparatively small work is apparently intended not only for the specialist and the researcher but for the practicing dentist who wishes to keep in touch with the over-all problems in biologic and microbiologic research.

The author describes a great deal of his own work and experience at the bacteriological laboratory of the University of Hamburg. It is impossible to enumerate in this brief review the multitude of topics covered in this book, but certainly anyone interested in the microbiology of the oral cavity should read it. Excellent illustrations, glossy paper and an extensive index enhance the value of this most interesting book.—*Paul H. Glucksman.*

■ THE AMELOBLASTOMA AND ITS SURGICAL TREATMENT. Nicholas Georgiade, D.D.S., M.D.; Frank Masters, M.D.; Charles Horton, M.D., and Kenneth Pickerell, M.D. Plast. & Reconstruct. Surg. 15:6 Jan. 1955.

A 15 year report on the incidence and treatment of ameloblastomas at Duke Hospital shows that 36 patients were found to have this pathologic condition. Histologically, the tumors vary considerably. Some of the tumors resembled the embryonic stage of the developing tooth follicle. Other tumors resembled squamous cell carcinoma. There is a clinical and roentgenological difference between the ameloblastoma and other tumors similarly located, such as the giant cell tumor and the ossifying fibroma. The treatment of choice in patients with ameloblastomas of the mandible is the resection of the involved region and immediate autogenous grafting.—*Irwin A. Small.*

■ THE AXHAUSEN OPERATION FOR CLEFT LIP REPAIR, MODIFIED AFTER THE HAGEDORN LE MESURIER PRINCIPLE. Hans May, M.D. Plast. & Reconstruct. Surg. 15:15 Jan. 1955.

In addition to closure of the defect, the modern principles in cleft lip repair aim at correction of deformities around the cleft, for example, deviation of the nose, flattened nostril, shortness and flatness of the lip. It may not be possible to reconstruct the nostril to a desirable shape during the initial operation. It is believed preferable to postpone the major shaping of the nasal cartilages until the child is approximately five years of age or older. Closure of the lip cleft, should result primarily in a good cosmetic appearance.

For many years the author has followed Axhausen's technic of cleft lip repair. Since the revival of the quadrangular flap method, this principle has been applied to the Axhausen technic with exceedingly gratifying results. The fullness of the lower fourth of the lip is achieved without sacrificing much skin. Designs are simple, and final determination of the length and adjustment of the quadrangular flap are made at the end of the operation so that changes still can be made. This is an important feature. The old Hagedorn operation as applied to the newer methods of cleft lip repair, particularly to the Axhausen method, is discussed in detail.—*Irwin A. Small.*

■ RECONSTRUCTION OF SCARRED PALATAL DEFECTS. J. J. Longacre, M.D., and Ray F. Gilby, D.D.S. Plast. & Reconstruct. Surg. 14:357 Nov. 1954.

The attempt to repair extensive defects of the palate with extraoral tissues is not new. After the first unsuccessful attempt by Blasius who used a flap from the neck, Thiersch (1867) successfully repaired such a defect with a flap, using the soft tissues of the cheek. Rotter (1869) successfully used a forehead flap. Later the method was used with good results by von Eiselberg and Blair, and in 1936 E. Padgett reported the use of the arm flap in nine cases of almost complete loss of hard and soft palate in which eight operations were successful.

As the result of bitter criticism leveled at operations which utilized extraoral tissue to repair gross palatal defects, few of these operations have been performed in the past. Operations similar in principle were used frequently during and after World War II to repair traumatic defects of the hard palate and for the repair of extensive defects of the hard palate as the result of radical resection for malignancy.

Prostheses have provided a partial answer to the problem. As a rule a prosthesis for an extensive defect is unsatisfactory. The efficiency of a prosthesis is inversely proportional to the size of the defect that it closes. In cleft palate rehabilitation, clinics are being faced with an increasing number of instances in which, as the patients lose their teeth as a result of mal-

occlusion and dental caries, the problem of retaining a satisfactory prosthesis becomes an increasing difficult one.

Methods will have to be found to meet the problem. Perforations and defects not exceeding one half of the hard and soft palate can be repaired with local mucoperiosteal flaps. More extensive losses, however, will require reconstruction with tissues migrated from distant donor sites. The only limitation is that enough tissue exists within the alveolar curve to serve as a raw base sufficient to obtain union after the skin flap is sutured in place.—*Irwin A. Small.*

■ Unconventional Measures in Surgery of the Jaw. A. Ragnell, M.D., and K. Hillerstrohm, D.D.S. Plast. & Reconstruct. Surg. 15:22 Jan. 1955.

Unusual pathologic conditions of the jaw necessitated original surgical measures and prosthetic devices for three patients. All three were women. The first patient had for 17 years received alternating surgical and radiation treatment for a recurring adamantinoma. In a single stage operation, the tumor was excised, together with one half of the mandible; dearticulation and reconstruction were achieved by a graft from the iliac bone. The appliances were fixed by wire supports in the facial skeleton.

In the second patient, there was an extreme anomaly of the jaw, with considerable protrusion of the mandible associated with recession of the midface. Operative correction consisted of bilateral transverse osteotomy of the mandibular rami and reconstruction of the midface. The anterior surface of the maxilla was built out with cancellous bone chips and the nose with a block bone graft. Splints were applied by the Hillerstrohm method.

The third patient had a jaw deformity with protrusion of the maxillary incisors and underdevelopment of the mandible. Operative correction consisted of bilateral transverse osteotomy of the mandibular rami, two stage osteotomy at the midline of the mandible and repositioning with fixation of cap splints.—*Irwin A. Small.*

■ The Effects of Various Methods of Treatment on Wound Healing. Peter Randall, M.D., and Rose J. Randall, B.A. Plast. & Reconstruct. Surg. 14:105 Aug. 1954.

The effects of several methods of treatment on the healing of a standard superficial wound are compared. A method for producing a controlled partial-thickness loss of skin by abrading the dorsal skin of the mouse has been described. These wounds were treated in 19 different ways, a minimum of ten animals being used for each type of treatment. The results at one week were classified as complete healing of the abrasion, partial healing or complete full-thickness loss of the entire area.

Good healing with complete epithelial coverage and good hair follicle survival was seen with a number of substances. The animals treated with these substances showed an average weight gain and a low death rate. A number of other methods of treatment were associated with poorer healing. Several methods of treatment converted a majority of the superficial wounds into wounds of full-thickness skin loss within the one week period.

The significance of the results and the possible role of skin cycles in the experimental study of healing and skin growth are discussed. The method of investigation used may prove useful in testing substances advocated for use on open wounds and burns. This method may also provide a critical means to study the process of wound healing.—*Irwin A. Small.*

■ Extended Retrohyoid Radical Neck Dissection for Cancer of the Oral Cavity and Neck. Joel J. Pressman, Surg., Gynec., and Obst. 100:329 March 1955.

A technic for performing extended radical neck dissection with or without hemimandibulectomy, including resection of involved structures of the oral cavity, is described. This technic is based on the premise that the hyoid bone is the surgical keystone of the neck. Removal of one lateral half of this structure allows the muscle to remain attached, simplifies and permits an *en bloc* dissection of all structures between the

trapezius and the midline from the mandible to the clavicle to a depth of the third layer of the deep cervical fascia.

Hemithyroidectomy, permitting one half of the gland to remain attached by the superior thyroid vessels, has recently been added as routine. The lymphatics concerned in and about the midline of the neck are described. Extended technic is considered justified because of the lymphatics present in the region of the midline of the neck which are not ordinarily resected. Examples cited in the literature show recurrence is frequent in the immediate region of the operative field as well as in lymph nodes on the opposite side of the neck. The procedure is justified also by the biology of the tumors, which ordinarily limits them to the region above the clavicle. The lack of spread to distant organs means that the tumors almost always can be surgically resected provided the field of neck dissection can be enlarged to include all possible locally involved regions. Extended retrohyoid radical neck dissection is proposed as a technical advance in control of these tumors.—*Irwin A. Small.*

■ BANTHINE AS AN ADJUNCT IN THE TREATMENT OF FISTULAS. Arthur B. Cecil and G. William Martin, Jr. Am. J. Surg. 91:421 March 1956.

It has been reported that few parotid duct fistulas induced by trauma will persist. However, the many different procedures for treating this disability attest to the fact that the injury is common and that there is a disagreement as to the best method of treatment.

Fistulas arising from the gland itself will usually close spontaneously or can be closed with conservative measures. Injuries to the duct more frequently result in a persistent fistula because of separation of the lacerated duct and epithelization of the fistula. Various surgical methods have been employed to correct a salivary fistula arising from a duct, including resuturing of the duct, implantation of the proximal end of the duct into the mouth, reconstruction of the duct using mucosal flaps or portions of veins and ligation of the duct. Ligation is said to cause atrophy of the gland, thereby curing the fistula.

Since the salivary glands are under control of the sympathetic and parasympathetic nervous systems, sectioning of the auriculotemporal nerve, with the postganglionic fibers from the otic ganglion, will decrease salivation and bring about closure of the fistula.

A case is reported in which 50 mg. of methantheline bromide (Banthine) given every six hours for one week was used in effecting a closure of a traumatically induced external fistula of the parotid duct. It is suggested that the parasympathetic inhibition of methantheline bromide would be beneficial after surgical approximation of severed ducts in the instances where the closure of the fistula is not possible. In the latter instance, lack of salivation would permit cicatricial closure of the fistula before the formation of two permanent epithelial channels.—*Charles C. Alling.*

■ MALIGNANT TUMORS OF THE SUPERIOR MAXILLA. Mercer G. Lynch. South. M. J. 48:569 June 1955.

Tumors of the maxilla account for only 2 per cent of malignant growth. Of these, 80 to 85 per cent involve the antrum. Symptoms of a neoplastic growth in the maxillary sinus are usually late in appearance. Those that originate on the floor of the sinus frequently cause pain in the teeth rather early so that an early diagnosis is made, and prognosis is improved.

Other symptoms include swelling, nasal blockage, nasal discharge, epistaxis and lacrimation. Metastatic extension from the floor of the sinus occurs first, usually in the submaxillary and carotid nodes which are surgically accessible.

Tumors from the upper part of the sinus usually metastasize earlier than those of the floor of the sinus. The retropharyngeal nodes and the ethmoid bone are often involved. The surgical procedure through an untouched field followed by extensive and thorough radiation would seem to be the treatment of choice in the neoplastic growths of the superior maxilla.

Tumors should be considered inoperable

if they have already reached the base of the skull or nasopharynx, or if there is distant metastasis or even extension to the opposite side. If the surgical approach is decided on, the modified Moore incision (incision which starts at the inner canthus of the eye and descends to the nasolabial fold and then crosses to the midline of the upper lip) followed by resection of the superior maxilla is preferable. Prior to the surgical procedure, it is advisable to ligate the external carotid artery on the same side. Skin grafting the cavity is not desirable because it might conceal evidence of an early recurrence.

Postoperatively, the wound cavity is packed with petroleum jelly and tincture of benzoin packs for about ten days. As soon as the packs have been removed, a mold of dental compound is inserted into the defect and is kept in place at all times except when irrigation or roentgen therapy is being administered. Irradiation is begun as soon as the cutaneous incision has healed; sutures and packing are removed about the tenth postoperative day. A month or six weeks after roentgen therapy has been completed, the permanent prosthesis may be fitted.—*Irwin A. Small.*

■ Fibrous Dysplasia of the Facial Bones. Frank F. Kanthak, M.D.; William G. Hamm, M.D., and Charles P. Yarn, Jr., M.D. Plast. & Reconstruct. Surg. 15:41 Jan. 1955.

Eight instances of fibrous dysplasia are studied from the standpoint of etiology and therapy. Fibrous dysplasia of the facial bones is frequently polycystic in nature and more than one facial bone is involved. The differentiation of fibrous dysplasia from the older term "ossifying fibroma" or "fibrous osteoma" may be difficult. It is not clear whether fibrous dysplasia represents a tumor or, as Lichtenstein and Jaffe mention, a failure of development of the mesenchyme in otherwise normal bone.

It is felt that treatment of these lesions should be directed toward removing the cosmetically or functionally interfering portion with restoration of contour and function. The patient should be followed for a long period of time to see that there is no recurrence. Roentgenotherapy seems to be indicated for reducing recurrences or for actually shrinking the size of the lesion.

Malignancy occurring in fibrous dysplasia of membranous bones has not been reported, but an instance of sarcoma arising in the long bones affected with fibrous dysplasia has been reported. In view of the benign nature of fibrous dysplasia of facial bones, massive resection of bone is seldom justified.—*Irwin A. Small.*

■ Infection with Herpes Simplex Virus. T. F. McNair Scott, M.D. Gen. Practitioner. 12:59 Sept. 1955.

The virus of herpes simplex is an ancient parasite of man. In most instances, its relationship to its host is symbiotic. In only about 15 per cent of people does the first invasion of this virus lead to clinical symptoms. In about 85 per cent, there are no clinical indications that the virus has actually caused an infection though infection is proved by the circulating antibodies in the blood of such people.

When the parasite has become established in its host, the latter becomes a carrier. In this phase, the virus lies latent and only causes trouble when physiologic changes in the host upset the balance of nature. Thus fever blisters occur not from a new infection, but from disturbances caused by sunlight, fever, menstruation, allergy, emotion and trauma. Such a carrier can spread the virus to other susceptible persons either from an obvious source or even from his saliva during apparent health.

The commonest clinical manifestation is recurrent herpes of the lips or face. A characteristic lesion is the thin walled group of vesicles on an erythematous base. It is characteristic that the recurrent lesions are grouped since presumably the latent virus in a few scattered cells, becoming activated, invade their immediate neighbors until a vesicle is formed. Circulating antibodies prevent the virus from spreading through the blood stream.

In children, recurrent lesions may be missed because of secondary infection, and the lesion diagnosed as impetigo. Clinically, the skin lesions of primary herpes are different

chiefly in that they are scattered rather than grouped. Treatment of occasional recurrent lesions consists of local applications of an antiseptic solution such as 70 per cent alcohol or cetylpyridiniumchloride (Ceepryn) or benzalkonium chloride (Zephiran). Recurrent herpes may involve other sites than the oral cavity or face. The eye, the genitalia and skin other than that of the face are common sites. Occasionally, individuals will be found who develop erythema multiforme of the skin and mucous membranes of the mouth within a few days of a recurrent manifestation such as a fever blister. It is presumed that such people are highly sensitive to the protein in the herpes virus. Treatment with cortisone immediately after the appearance of a fever blister may prevent such an attack.

The commonest clinical manifestation of the primary infection is acute herpetic gingival stomatitis. This occurs most commonly in children between the ages of one to three years, and herpes virus is the commonest cause of stomatitis in those years. The essential lesion is a vesicle. Most commonly, the initial lesion is not recognized as a vesicle because the vesicle soon collapses, becomes macerated and is covered by a greyish yellow membrane. The lesions can occur anywhere in the mouth and sometimes occur in the throat where they may be mistaken for a bacterial sore throat or for herpangina resulting from coxsackie A virus. The lesions of herpangina do not spread to other parts of the buccal mucosa. They occur as part of an epidemic, and in the laboratory the viruses are quite distinct.

Although herpetic infection in the mouth is more common in children, it may occur in adults and cause a picture similar to that in children. Two other clinical features deserve mention. There is almost always redness of varying degree at the margin of the gingiva when teeth are present. Submental and submandibular lymphadenopathy are always observed. Children often become seriously ill with acute herpetic gingival stomatitis. They run a high fever and readily become dehydrated because the sore mouth prevents intake of liquid and food. Treatment should include supportive measures for relief of dehydration. Older children may derive benefit from a topical anesthetic, but in infants the application of the anesthetic is more irritating than helpful. Penicillin may be valuable in suppressing secondary bacterial infection.

The virus infection is diagnosed in the laboratory by several methods. In 12 day old eggs, the virus produces pox on the chorioallantoic membrane. In suckling mice, intraperitoneal or intracerebral infections will produce death. Scarification of the anesthetized cornea of a rabbit's eye leads to keratoconjunctivitis in a few days. The virus can be grown in test tubes with Hela cells growing in them, and the virus can be isolated and identified by this technic.—*Irwin A. Small.*

■ EXTENT OF MANDIBULAR RESECTION REQUIRED FOR TREATMENT OF ORAL CANCER. Louis T. Byars. Arch. Surg. 70:914 June 1955.

Malignant tumors involve the mandible by one of five methods. The mandible is rarely the site of a metastasis or of a primary growth. Most frequently an advancing primary lesion of the oral mucosa penetrates its integument, involving the upper surface and entering the bone. Invasive cancer of the lip may spread to the region of the mental foramen, enter it and travel up to the core of the mandible. Lesions of the oral mucosa in the cuspid region behave similarly. Cancer of the lip and sometimes that of the face and cheek metastasize to the "buccal lymph node." This is a node in the cheek-neck position occurring at the point where the facial artery crosses the lower border of the mandible. Such a node is separated from the bone by a bit of areolar tissue and quickly invades the mandible by direct encroachment.

The surgeon may select one of two procedures when the mandible is involved. Resection of the cancer along with the periosteum and a plate of underlying bone is the simplest operation. This method does not interrupt the continuity of the mandible. A conservative approach must, of course, be used for lesions of minimal extent. More frequently a radical resection is necessary.

A block section may be excised, or the mandible may be resected and disarticulated.

The simple segmental resection is quicker and easier to perform; it is followed by a smoother postoperative recovery, causes less deformity and lends itself to secondary repair if such is indicated. It may also be an inadequate procedure under certain conditions.

The basic consideration in choosing the type of treatment depends on whether or not the inferior dental canal with its vessels, nerves and lymphatics has been entered by cancer cells. The dental canal forms a natural path for cancer dissemination and, if invaded, any operation other than adequate jaw resection with disarticulation at the temporomandibular joint is likely to leave behind a segment of mandible with cancer growing in its core. In the operative procedure, the mandible is supported by Kirschner wires of various shapes or other suitable material. No effort is made to shape the bar to conform to the normal contours of the mandible. Rather, the prosthesis follows the straightest line between the two points and is so placed that it will lie between inner and outer soft tissue coverings. As secure a closure of intraoral tissue is made as possible. In most instances, the prosthesis is a temporary splint which is removed in two to six weeks. In some cases it becomes permanent.—*Irwin A. Small.*

■ Dental Bone Changes Occurring in Sickle Cell Diseases and Abnormal Hemoglobin Traits. J. R. Prowler and E. W. Smith. Radiology 65:762 Nov. 1955.

A dental roentgenographic study is reported of 55 individuals, 35 of whom had the various genetic forms of sicklemia, 4 with hemoglobin C trait and 16 with no demonstrable hemoglobin abnormality. These patients were divided into two groups: the first group included 45 persons with a previously established diagnosis, the second group of ten individuals were not previously suspected of having any hematologic disorder. These ten were selected solely on the basis of sickle cell changes in the bone pattern that were evident from their dental roentgenograms. Of these individuals, one was found to have sickle cell anemia, one had sickle cell hemoglobin C disease, two had hemoglobin C trait, two had no abnormality and one was not available for study.

The roentgenographic changes ranged from complete absence of trabeculae in the mandible and maxilla, except along the alveolar crest, to minimal changes such as one or two large radiolucencies in the mandible which could not be explained on a dental basis. Certain radiopacities of nondental origin appear in the more severe forms of sicklemia and are thought to be of similar origin to the healed bone infarcts seen in the long bones of these patients.

Roentgenographic changes in the dental bones were demonstrable in every instance of sickle cell disease. A relationship between the severity of the dental bone changes and the clinical severity of the disease is suggested by this study.

It would seem from the results of this study that dental roentgenograms may be of considerable value in detecting individuals with hemoglobin abnormalities.—*William F. Via, Jr.*

■ Fibrous Dysplasia of the Mandible. Michael L. Lewin, M.D. Am. J. Surg. 90:951 Dec. 1955.

Four cases of fibrodysplastic lesions of the mandible are discussed. The differences in the clinical behavior of these tumors is emphasized. Most surgeons advocate conservative management. When the lesions achieve such proportions that facial disfigurement is noticeable, a cosmetic trimming operation is performed which leaves in its wake the bulk of the pathologic tissue. In spite of the lack of long term observation, it appears that this management is adequate in most instances. Frequent recurrences are reported even after secondary operations.

Some surgeons believe that repeated conservative procedures will "wear out" the lesion. Others who are impressed with the huge fibroblastic tumors of the mandible, look on them as benign tumors which behave like malignant ones and insist that they be so treated. They designate these tumors as osteofibromas and recommend that they be completely resected in the early stages to avoid a radical excision later. Un-

doubtedly, a great many of these tumors have been so resected with complete cure. Many could have been controlled by a less radical procedure.

Opinions have been advanced that any operative interference short of radical resection is dangerous in a growing fibroblastic tumor since it presumably precipitates further growth. This point of view is based on the observation of tumors which develop to large proportions after incomplete surgical intervention. The question as to how such a tumor would behave otherwise remains unanswered. All these tumors had a history of active enlargement.

If one assumes that the pattern of growth remains unchanged, it is not surprising that the tumors reached huge dimensions. There are several instances on record of extensive mandibular tumors which reached that stage before they were exposed to any surgery. With a rapidly growing tumor, any conservative approach will have only temporary effect. Complete resection of a single lesion practically assures a cure.

Segmental resection of the mandible and hemimandibulectomy with immediate or delayed restoration of continuity by bone graft and prosthetic restoration offer a relatively satisfactory result, certainly preferable to a disfiguring enlargement of the mandible. Major resections in children carry the implication of impairment of the growth of the mandible and soft structures. This can largely be controlled by adequate reconstructive follow up. The fibrodysplastic lesion is not sensitive to radiation. However, it is claimed that radiation is of value in arresting the growth of the lesion and preventing recurrence after conservative operations. Such treatment may require tumor doses of a few thousand r. In children, one rightly hesitates to use extensive irradiation because of the secondary effect upon the bony growth and soft tissues.

Malignant degeneration in the form of an osteosarcoma is sufficiently rare that it need not influence the surgical indications. A sudden and unusual spurt of growth will naturally bring this possibility to mind. In most instances, the spurt of growth will be part of the natural course of the disease.

Many of the fibrodysplastic lesions in the mandible are found on routine dental examination. They are symptom-free and painless. The roentgenologic picture of these tumors is not sufficiently characteristic so they can be differentiated with certainty from the variety of cyst and cyst-like lesions in the mandible. Hence, most surgeons welcome a biopsy.

A small stationary lesion does not require any treatment. It is only when it shows progressive enlargement that one must consider at what point surgical intervention is indicated. There can be no standard treatment for a disease which shows such fluctuation in its course. Since only a small percentage of these lesions reach dangerous proportions, a conservative approach is justified. It is only when this approach proves ineffective that a radical resection should be considered. The dilemma is even greater in dealing with polyostotic fibrous dysplasia since no surgical procedure will effect a total cure. However, surgical intervention can contribute toward rehabilitation of the individual, and this factor will govern the choice of procedure. —*Irwin A. Small.*

■ SIALOGRAPHY. J. Winsten, D. M. Gould, and G. E. Ward. Surg., Gynec. & Obst. 102:315 March 1956.

Since the early 1900's, studies of the parotid gland using radiopaque media have been performed and reported. The first case reportedly done in the United States was in 1928, and the largest series reported was 110 cases from Massachusetts General Hospital in 1947. The procedure is widely known as sialography, and the condition of saccular dilatation as sialectasis. There has been some contention that the terms should be respectively, sialoangiography and sialoangiectasis.

No premedication is required, and rarely is infiltration of local anesthetic about the orifice of the parotid duct necessary. Massaging the gland may better demonstrate the duct orifice if it is not apparent. The stoma is dilated with a graduated series of lacrimal probes until a size 3 or 4 probe is attained. A lacrimal duct cannula, with an internal diameter of at least

0.5 mm. is inserted attached to a Luer-Lok 5 cc. syringe containing either iodized oil, iodochloral, or a resorbable media, oily dionosil. Approximately 1.75 cc. of the media is injected slowly and steadily. The following roentgenograms are made immediately: anteroposterior, lateral and basal views of the skull in true projections and a tangential view of the region as indicated. With these roentgenograms, six portions of the parotid gland may be studied: anterior superior and inferior, posterior superior superficial and deep and posterior inferior superficial and deep.

The normal parotid gland exhibits considerable variations in conformity, but usually the duct will not exceed 3 mm. in diameter and will point toward the cervical vertebrae. The phrases "winter tree" and "summer tree" have been used to describe the appearance of incomplete filling of the gland and overfilling of the gland with radiopaque media. If the pressure is excessively great during introduction of the media, rupture of the finer ducts may occur with spillage of the media into the parenchyma of the gland. The result is that roentgenographically the border of the media is hazy and indistinct.

Lesions noted by sialographic technics may be grouped in three major categories: Group 1 is composed of extrinsic lesions such as adjacent metastatic lymph nodes, lesions of the pterygoid fossa, mandibular tumors, and lipomas of the cervical or buccal fat. These lesions will displace the gland mass but rarely distort the ductal pattern.

Group 2 contains intrinsic lesions such as neoplasms primary in the parotid gland, cysts and abscesses. In these instances, there is a divergence of the ductal pattern around the lesion; in some cases, evacuation of an abscess or cyst contents may have occurred in the ductal system with subsequent filling of the cavitation by the contrast media.

Abnormalities of the duct system, group 3, are usually inflammatory in nature and may be initiated by retrograde or blood-borne infection, paratitis, calculi and ductal strictures; sialectasis is the result of any inflammation of the parotid gland and produces roentgenographic pattern-puddling of the opaque medium in the dilated terminal branches of the duct. Such a pattern indicates sacculations of varying size that may coalesce, forming multilocular cavities.

Sialography is valuable in locating and even in indicating the type of lesions, but the method is an adjunct to diagnosis and not a short-cut process.—*Charles C. Alling.*

■ TEMPOROMANDIBULAR JOINT ANKYLOSIS WITH MANDIBULAR RETRUSION. Varaztad H. Kazanjian, M.D., D.M.D. Am. J. Surg. 90:905 Dec. 1955.

An instance of temporomandibular joint ankylosis associated with an extreme degree of retrusion of the mandible is presented. Restricted motion of the lower jaw with progressive ankylosis was first noted at an early age. Jaw development was retarded. Treatment involved two problems: (1) the restoration of normal movement of the lower jaw, and (2) the correction of the facial deformity.

Re-establishment of mandibular motion requires the construction of a false joint which is accomplished by resecting a transverse section of bone across the ankylosed neck. The section of bone to be removed should leave a space approximately 6 to 8 mm. This space is filled with a fascia lata transplant. When the patient has bilateral ankylosis, only one side is operated on in the first stage; the opposite side of the jaw is operated on six to eight weeks later. If both sides are done at the same time, the upper pull of the elevator muscles of the mandible will reduce the space between the two bone surfaces and may cause eventual failure.

No special postoperative care is required in the form of mouth gags or exercise. The patient is put on a liquid diet at first in order to give the transplanted fascia a chance to take. After a short period, solid food can be chewed. The correction of the deformity of the lower portion of the face should be delayed until full growth of the mandible is completed. In the meantime, attention is directed to the patient's dental and mouth hygiene.

Preoperative planning for the mandibular reconstruction should include a careful study of the existing relations of the upper and lower jaws and the possibilities of future efficient

dental restorations. Models are made of the upper and lower jaws and mounted on an articulator and, by cutting them in various places, it is possible to see how the lower teeth can be brought into the most satisfactory relation with the upper teeth.

By performing a sliding osteotomy, the body of the mandible is elongated, and the lower anterior teeth and alveolar ridges are brought into a more harmonious relationship with the upper jaw. In a sliding osteotomy, provision should be made prior to the operation for efficient postoperative means of immobilization of fragments.—*Irwin A. Small.*

■ CRANIAL COMPLICATIONS OF MAXILLOFACIAL INJURIES. Adren Ver Brugghen. Am. J. Surg. 90:897 Dec. 1955.

The neurosurgeon sees many injuries which involve the bones and structures of the face, injuries which are striking because of the disfigurement. In spite of the damage to the facial structures, the brain seems to escape serious injury except for the more profound injuries in which nothing escapes serious damage. Electroencephalography may demonstrate damage to the brain. In many of these patients, further electrical studies of the brain will show gradual improvement to the point of a return to normal brain waves. A certain percentage will suffer posttraumatic epilepsy. The number ranges from 5 to 10 per cent.

In all injuries to the brain, it is essential that oxygenation be maintained through an adequate airway. Injuries to the nasal apparatus, the mouth and pharynx are likely to cause obstruction to the airways so that tracheotomy may be required.

Consultation between the neurosurgeon and maxillofacial surgeon should determine treatment. The maxillofacial surgeon, seeing the damage to the structures of his field of interest, wishes to begin his work of reconstruction and realignment as soon as possible. The neurosurgeon may feel that a general anesthetic threatens the brain and advise delay.

A situation confronting both surgeons is the postconcussion or posttraumatic state. Headache, dizziness and lack of concentration may be produced by trauma. Later this condition may gradually change to posttraumatic neurosis, a neurosis precipitated by injury.

Where there is no detectable neurologic damage, other signs must be looked for in the consideration of cranial complications. Ecchymosis in the eyelids is usually produced by blood that has tracked down under the galea aponeurotica to the soft tissues of the eyelid. Subconjunctival hemorrhages usually have a posterior limit. This indicates that blood has come in from the orbit. This condition is strongly suggestive of a skull fracture in the roof of the orbit and across the anterior fossa. One should be on the lookout for rhinorrhea in such a case, especially if there is some persistent bleeding from the nose. Unless the arrest of hemorrhage is a lifesaving matter, the nose should not be tamponaded when there is the possibility of a cerebrospinal leak through the cribriform plate.

Backed up infected spinal fluid may cause meningitis which is still a fairly serious condition, even with chemotherapy and antibiotics. Patients suspected of having this condition should sit up all times so as to bring the brain down on the anterior fossa and possibly seal off the crack in the bone. Sulfadiazine and appropriate antibiotics should be started at once. The patient should be told to let the spinal fluid drip, and under no circumstances should he blow his nose. Should a spinal fluid leak persist for more than a few days, some intracranial procedure should be adopted to close it.

Fractures in the anterior fossa may produce optic nerve impairment caused by fragments of indriven bone. Under these circumstances, there will be complete or partial blindness in the affected eye. Oculomotor palsy may be produced by fractures at the base near the posterior part of the orbit. In such cases, there is a widely dilated fixed pupil with ptosis, the eye being held in a position of lateral gaze. However, the unaffected pupil will respond to light beamed on the affected eye.

Injury to the facial nerve is usually the result of fracture to the petrous portion of the temporal bone and occurs in about 3 per cent of head injuries. Interruption of the petrous

bone may be postulated when Battle's sign is seen. This consists of ecchymosis and a brawny swelling immediately behind the ear, in the absence of a nearby wound or bruise of the scalp. About 15 to 20 per cent of such patients may have a facial paralysis or weakness. A well trained neurosurgeon is invaluable in the early care of the patient, especially in regard to the status of the brain. At the earliest possible safe moment, the neurosurgeon should turn the patient over to his colleagues in the maxillofacial field.—*Irwin A. Small.*

■ INJURIES TO THE MIDDLE THIRD OF THE FACE. Joseph G. Kostrubala, M.D., D.D.S. Am. J. Surg. 90:887 Dec. 1955.

Severe injuries to the middle portion of the face present a multiplicity of problems. However, these injuries do follow an understandable pattern. The obtaining of good results in the needed maxillofacial surgery requires training not only in the principles of general surgery but also in the specialized knowledge of the anatomy and physiology of the face.

An anterior application of a force of sufficient intensity usually results in a transverse fracture and posterior dislocation of the maxilla. The maxilla alone may be fractured, or there may be a craniofacial fracture dislocation. In that case, the line of fracture may extend through the root of the nose into the lateral orbital rims. The zygomatic processes are bilaterally fractured. Fractures of the nasal bones, zygomatic bones, alveolar process and the avulsion of teeth are usually associated injuries. The palate may be split longitudinally, and only one side may be displaced posteriorly while the other may remain in good position. Fractures of such magnitude are frequently associated with fractures of the skull, with brain damage in varying degrees, injuries of the eyes and fractures of the mandible.

A thorough examination should be performed as soon after the injury as possible. Clinical examination is by far the most important; and although immediate repair may not be indicated, the examining doctor may note the extent of the injury, the location of the facial fractures and occlusion of the teeth. Roentgenographic examinations are important from the medico-legal point of view and, in some instances, may be of distinct value in aiding the surgeon in performing necessary operations.

Shock must be treated as soon as possible, and if not present, it should be suspected and prevented. Hemorrhage must be arrested. The treatment of brain injury must take precedence over all other considerations, except for that condition which may aggravate or continue the symptoms of an injured brain. Special attention must be paid to the establishment of a good airway and the prevention of possible aspiration of blood or oral secretions. Pharyngeal suction must be maintained, and if this is found inadequate, a tracheotomy is definitely indicated.

Avulsed teeth, particles of bone and loose hanging oral soft tissues are best removed from the oral cavity at first examination. The same applies to any loose fixed dental restoration and to dentures which may still be present in the mouth. Lacerations of the face should be closed as soon after the injury as the condition of the patient permits. Conservatism, meticulous approximation of wound edges and the use of fine suture material contribute much to the prevention of deforming scars.

Reduction of fractures and their immobilization should not be delayed beyond the period of three weeks. Open reduction, if indicated, avoids a complicated and cumbersome appliance. Open reduction quickly establishes stability in the lower third of the face and usually results in an accurate reduction of the facial fracture.

Where adequate dentition is present, intermaxillary and interdental wire fixation is fast and simple. In an edentulous mouth, the patient's denture may be used, or one may have to be constructed in such a way as to allow the traction wires to be firmly attached to it. In selected patients, skeletal traction may be used. This procedure entails connecting the ivy loops to the lower portion of the zygoma or to the orbital rims with wires which are carried through drill holes in the bone. This method eliminates not only the use of a head gear but also the perforations through the cheek.—*Irwin A. Small.*

■ SURGICAL RECONSTRUCTION OF THE TEMPOROMANDIBULAR JOINT. Orion H. Stuteville, D.D.S., M.D., and Robert P. Lanfranchi, D.D.S. Am. J. Surg. 90:940 Dec. 1955.

Fractures of the mandible with displacement of the condyle may not be ignored; complete immobilization of the jaw for several weeks is insufficient treatment. The treatment of a fracture of the right condyle with medial displacement is described.

The condyle was approached by means of a preauricular incision. A four hole metal condyle plate was placed across the fracture line, and the bony parts of the fracture were held together by two screws in each fragment. The ideal treatment of a displaced condylar fracture is re-establishment of the original position of the parts; but there are instances in which it is necessary to accept less than the ideal.

Such a compromise must be made: (1) when the condyle is so severely comminuted that its original contour cannot be restored, (2) when the patient is seen so long after injury that the fragments have resorbed and (3) when the patient's condition will not permit early surgical intervention.

In a second patient, delayed treatment of a bilateral fracture dislocation of the mandibular condyle required the use of a graft. An autogenous bone graft from the ilium was shaped to simulate the condyle and was held in position in the joint by means of intraosseous wiring.

Cases three and four describe the recommended treatment for the reconstruction of a temporomandibular joint. After condylectomy for the temporomandibular joint ankylosis, cartilage was obtained from the patient's rib and shaped to simulate the mandibular condyle. The cartilage was held in position by means of two wire sutures. The fifth case describes a new surgical correction for loss of growth at the condyle. The metatarsal bone was removed from the patient's foot and, after condylectomy, the head of the metatarsal bone was placed into the glenoid fossa, and the opposite end attached to the mandible with stainless steel wire ligatures. In all of the described cases, intermaxillary elastic traction was used to maintain fixation of the mandible during healing.—*Irwin A. Small.*

■ THE ACTION OF CORTISONE ON THE TEETH OF RACHITIC RATS. Zvi Laron, B. D. Cavlas and J. D. Crawford. Arch. Path. 61:177 Feb. 1956.

Administration of cortisone to human beings sometimes induces osteoporosis and may retard skeletal growth and maturation. This study reports the effect of cortisone on the developing dentin of rachitic rats and is a part of a study of the antagonism between vitamin D and cortisone.

Rats were made rachitic by feeding a low calcium and vitamin D free diet for 17 days. Various combinations of calcium, vitamin D and cortisone were given, and the effects noted.

There was no significant change in inorganic phosphorus in any combination of therapies. However, serum calcium was significantly increased whenever cortisone was used. Serum alkaline phosphatase was increased, but to a lesser degree by cortisone. There was no interference with dentin matrix formation, but when calcium, vitamin D and cortisone were used, the band of predentin was wider and less calcification was noted than when calcium and vitamin D were used without cortisone.

Cortisone clearly retarded calcium deposition in developing dentin at the 5 mg. per day dose level.

A blocking of the action of either vitamin D or cortisone when used together was not observed. Therefore, the increase in serum calcium and alkaline phosphatase and interference with dentin maturation that was observed must be the result of an antagonistic action at different locations rather than an intermolecular destructive reaction between the two steroids.—*William F. Via, Jr.*

Announcements

■ American Society of Oral Surgeons Sets September Meeting

The American Society of Oral Surgeons meets September 25-28 in New York. R. F. Whalen of Richmond, Va., is executive secretary.

■ Ten Symposiums Planned for Annual Session Program

Dental photography and hypnosis in dental practice are among the subjects of panel discussions on the scientific program at the Association's annual session in Atlantic City, N. J., October 1-4. Ten symposiums are planned. It is the first time that hypnosis and dental photography have been selected for symposium subjects at an Association annual session.

Moderators for a number of the discussions have been announced. Irwin A. Epstein of St. Paul will moderate a panel on present day endodontic practices; Reidar F. Sognnaes of Boston, "Oral Cancer—Clinical Implications of Recent Research," and Harold W. Krogh of Washington, D. C., "Anesthesia for Operative Dentistry."

Serving as moderator for a panel on efficiency in dental practice is Wallace N. Kirby of Downers Grove, Ill. Other moderators and their subjects are: Henry M. Tanner of Bethesda, Md., "Current Status of High Speed, Super Speed and Ultrasonic Cutting Instruments"; George C. Paffenbarger of Washington, D. C., "Pitfalls in Handling Filling Materials"; Harold K. Addelston of New York, "Anesthesia for the Child Patient"; Wilbur O. Ramsey of Baltimore, "Viewpoints on Hypnosis in Dental Practice"; Charles H. Patton of Philadelphia, "Health Problems of the Dentist," and Samuel C. Miller of New York, "Periodontics for the General Practitioner."

In addition to the essay program, the scientific session will include projected clinics, table clinics, motion pictures, scientific and commercial exhibits.

■ Oral Surgeon Chosen General Chairman for 1958 Annual Session

P. Earle Williams of Dallas, Texas, an oral surgeon, has been chosen General Chairman of the Committee on Local Arrangements for the 1958 annual session of the American Dental Association. Dr. Williams, who was nominated by the Dallas County Dental Society and the Texas Dental Association, was confirmed for the post by the national organization's Board of Trustees in April. Dr. Williams is an active member of the American Society of Oral Surgeons.

A second action taken by the Trustees of particular interest to oral surgeons was the decision to publish the JOURNAL OF ORAL SURGERY as a bimonthly beginning with the January 1958 issue.

The Board appointed a six man Special Committee on Problems in the Field of Oral Surgery. Serving on the committee are Paul H. Jeserich of Ann Arbor, Mich., chairman; James R. Cameron of Philadelphia; Leslie M. FitzGerald of Dubuque, Iowa; Fred A. Henny of Detroit; Daniel F. Lynch of Washington, D. C., and Ormande J. McCormack of Syracuse, N. Y. Committee consultants are Frank B. Hower of Louisville, Ky., and Bernerd C. Kingsbury of San Francisco.

■ W. G. Shafer Heads Academy of Oral Pathology

W. G. Shafer of Indiana University was installed as president of the American Academy of Oral Pathology at its tenth annual meeting April 8 in Washington, D. C. Accompanying Dr. Shafer into office were R. W. Tiecke of Northwestern University Dental School, president-elect; Charles A. Waldron of the Armed Forces Institute of Pathology, first vice-president, and Henry H. Scofield of

the Naval Dental School, second vice-president. Also installed were Col. Joseph L. Bernier, Armed Forces Institute of Pathology, secretary-treasurer; David F. Mitchell of Indiana University School of Dentistry, editor, and Myron S. Aisenberg of Maryland, a director of the American Board of Oral Pathology.

The Academy elected five Fellows, emeritus. They were: Kurt H. Thoma, Carl W. Waldron, Thomas J. Hill, J. Roy Blayney, Edgar D. Coolidge and William Bauer.

■ Samuel Charles Miller Appointed Chairman of American Board of Oral Medicine

Samuel Charles Miller of New York has been appointed chairman of the incorporated American Board of Oral Medicine, announces S. Leonard Rosenthal of Philadelphia, president of the American Academy of Dental Medicine. Other appointments are Lester W. Burket of Philadelphia, secretary; Hermann Becks of San Francisco; Harold Gelhaar of Upper Montclair, N. J.; Irving Glickman of Boston, and Joseph F. Volker of Birmingham, Ala., members.

■ Dental Abstracts Aided by Contributing Abstracters

A group of contributing abstracters to DENTAL ABSTRACTS, the Association's new monthly publication, is in part responsible for the extensive coverage of world dental literature maintained by the magazine.

Swedish, Norwegian and Danish dental journals are abstracted for DENTAL ABSTRACTS by Gunnar Ryge, assistant professor and director, department of dental materials, Marquette University School of Dentistry, Milwaukee, Wis.

Three persons contribute abstracts from current dental literature published in Spain, Portugal and Latin America. Señora Eloisa DeBarroso and Miss Josefa Thornton are experienced medical abstracters on the staff of the American Medical Association in Chicago. George French, of Wilmington, Del., is a dentist who has spent many years in Latin America.

George G. Philippas, an Athens dentist, contributes abstracts from the Greek dental and related literature.

Mrs. Paula Gollick, an assistant editor of the *Journal of the International College of Surgeons*, Chicago, contributes abstracts from Finnish and Russian dental magazines. Russian medical literature is covered for DENTAL ABSTRACTS by Barbara Kessler, a physician in the district polyclinic at Bitterfeld, East Germany.

Abstracts of United States medical literature of interest to dentists are contributed by A. F. Baranoff, San Francisco, a dentist.

Japanese dental literature is scanned and abstracted by Masao Onisi, of the Department of Microbiology, Tokyo Medical and Dental University.

Most of the abstracts in DENTAL ABSTRACTS are prepared by the Association's editorial staff.

■ Gordon Research Conference Called for Mid-July

Five speakers from abroad are among essayists on the program of the 1956 Gordon Research Conference on the Chemistry, Structure and Physiology of Bones and Teeth. The Conference will be held July 16-20 at Kimball Union Academy in Meriden, N. H. The five speakers are J. T. Irving, M.D., of the University of Witwatersrand, Johannesburg, South Africa; Jenifer Jowsey, Ph.D., of Oxford and Chicago Universities; Bengt Engfeldt, M.D., of the Karolinska Institute in Stockholm; Yngve Ericsson, L.D.S., Ph.D., of the Royal Dental College also of Stockholm, and Shirley Glasstone Hughes, L.D.S., of the University of Cambridge in England. Chairman of the conference is Reidar F. Sognnaes of the Harvard School of Dental Medicine.

■ X-Ray Equipment Adapted to Study of Cleft Palate

A stereocephalostat, which permits the taking of three-dimensional pictures to show the relation of bone and tissue to each other, has been installed at the Cleft Lip and Palate Institute of Northwestern University Dental School. The school believes that it is the first time such equipment has been adapted to the study of problems of cleft palate.

The machine's source of radiation is a new high-speed x-ray unit with a small rotating anode that gives fine detail and images of delicate bony structure. The positioning device was designed by T. M. Graber, associate professor of orthodontics and director of research at the Institute. Pictures may be taken of patients of any age from birth to adulthood. It is possible to take lateral, frontal and vertical pictures at oriented angulations as small as one degree. Installation of the stereocephalostat was made possible by a gift of over $3,000 from the Rogers Park Kiwanis Club.

The U. S. Public Health Service has awarded the school a grant of $14,000 for a study of cleft palate to be conducted by Dr. Graber.

■ Television to be Featured at F.D.I. Rome Congress

An extensive television program will be a feature of the 1957 Rome Congress of the Fédération Dentaire Internationale, announces A. K. Ovadia, chairman of the cinema and television committee. Some of the programs to be presented at the F.D.I.'s 12th International Dental Congress will be telecast throughout Italy. Others are scheduled for international transmission. In addition, table clinics and clinical demonstrations will be shown on closed circuit TV. Dentists with kinescopes suitable for use on the program are asked to contact Dr. Ovadia, Via Boezio 16, Rome, Italy.

■ Middle Atlantic Society Sets December Meeting Date

The Middle Atlantic Society of Oral Surgeons will hold its annual meeting December 12 in Baltimore. The West Virginia section of the society meets July 22 at the Greenbrier Hotel, White Sulphur Springs, W. Va.

Editorial communications

■ ORIGINAL COMMUNICATIONS—This journal invites concise original contributions in the broad field of clinical and experimental surgery of the mouth and associated structures, including roentgenology, diagnosis, anesthesia and oral surgical pathology. Articles are accepted for publication with the understanding that they are contributed solely to the JOURNAL OF ORAL SURGERY. All manuscripts are subject to editorial modification. Neither the editors nor the publishers accept responsibility for the views and statements of authors expressed in their communications.

■ MANUSCRIPTS—Manuscripts submitted for publication should be sent to Fred A. Henny, Editor, Henry Ford Hospital, Detroit, Michigan.

Manuscripts should be typewritten on one side of the paper only with double spacing and liberal margins. The author's name and abbreviated title of the article should appear at the top of each manuscript page. The original should be sent to the editor and a carbon copy retained by the author. Manuscripts will not be returned if accepted for publication.

References should be placed at the end of the article and should conform to the style of the Quarterly Cumulative Index Medicus; viz., name of author, title of article and name of periodical with volume, pages, month and year. They should be numbered and should appear in the same order as that of the superior figures inserted in the appropriate positions in the text.

■ ILLUSTRATIONS—Illustrations accompanying manuscripts should be unmounted and numbered. The author's name should appear on the margin or back.

Authors should insert figure numbers at appropriate places in the text. The original drawings, or glossy print photographs of them, should accompany the manuscript. Legends for illustrations are to be typewritten in a separate list with numbers corresponding to those on the photographs and drawings.

A reasonable number of halftone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editors for color plates, elaborate tables or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered in India ink or with black typewriter ribbon (carbon paper placed with carbon against back of sheet for bolder type). Ordinary blue or colors will not reproduce. Only good photographic prints or drawings should be supplied for halftone work.

■ CASE REPORTS—Case reports will constitute an important department of the journal and the editors welcome case reports that are of unusual clinical value or that present exceptional conditions of interest.

■ EXCHANGES—Letters, exchanges, reprints and all other communications relating to the JOURNAL OF ORAL SURGERY should be sent to the American Dental Association, 222 East Superior Street, Chicago 11.